Metals Review
THE NEWS DIGEST MAGAZINE

Volume XXV - No. 6 June, 1952

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PHILADELPHIA OCT. 20-24

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXV, No. 6 JUNE, 1952

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7th metallographic exhibit

Entries are invited in the 7th Metallographic Exhibit, to be held during the National Metal Exposition in Philadelphia the week of Oct. 20 through 24, 1952. Entries will be displayed to good advantage and awards will be given for the best micrographs as decided by a competent committee of judges.

CLASSIFICATION OF MICROS

1. Toolsteels and tool alloys
2. Stainless and heat resisting steels
3. Other steels and irons
4. Aluminum, magnesium, beryllium, titanium and their alloys
5. Copper, zinc, lead, nickel and their alloys
6. Metals and alloys not otherwise classified
7. Series showing transitions or changes during processing
8. Surface phenomena
9. Results by unconventional techniques (other than electron micrographs)
10. Slags, oxides and inclusions

RULES FOR ENTRANTS

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard of maximum dimensions approximating 15 by 22 in. (14 by 18 in. for entries from outside U. S. A.). Heavy, solid frames are not permissible because of difficulties in mounting the exhibit. Entries should carry a label giving:

Name of metallographer
Classification of entry
Material, etchant, magnification
Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Sept. 25 and Oct. 15, 1952, either by prepaid express, registered parcel post or first class letter mail.

Address: Metallographic Exhibit
Metal Exposition
Convention Halls
Philadelphia 4, Pa.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate, and a money award of $100 will be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's headquarters.

All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Oct. 27, 1952.

Entrants living outside the U. S. A. will do well to send their micrographs by first-class letter mail endorsed "May be opened for customs inspection before delivery to addressee".

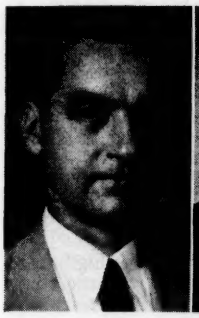
A "Student Competition" will also be made part of the exhibit, as in the past few years. Rules for entries in the Student Division were published in the February and March issues of Metals Review.

34th National Metal Congress and Exposition

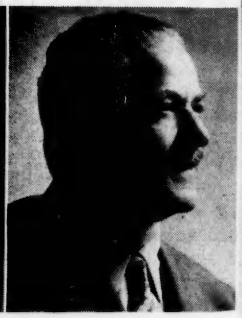
Philadelphia, Pa. **October 20 to 24, 1952**

Nominations of National Officers for 1952-53 Announced

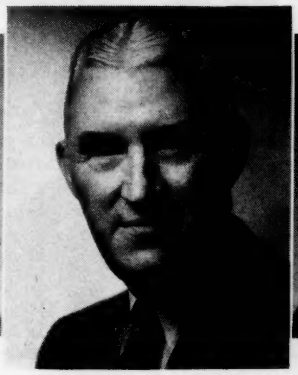
MELLON INSTITUTE



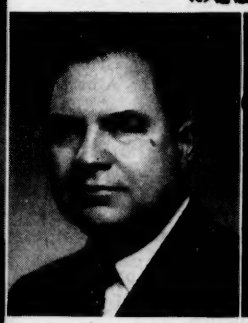
A. O. Schaefer for Trustee



W. H. Eisenman for Secretary



R. L. Wilson for President



J. B. Austin for Vice-President

H. B. Knowlton for Trustee

Nominations for new national officers of the American Society for Metals have been announced by the Nominating Committee, which met in Chicago on May 20, under the chairmanship of Gilbert Doan, professor of metallurgy at Lehigh University.

R. L. Wilson, currently serving as vice-president, was nominated for president, and J. B. Austin, director of research of the research laboratory, United States Steel Co., has been selected as the nominee for vice-president.

The committee of past presidents who nominate a secretary met in New York on May 21 and nominated W. H. Eisenman for the 18th time. This committee consisted of A.S.M. President John Chipman, chairman, and the six men who most recently held office of A.S.M. president.

Two additions proposed for the Board of Trustees are A. O. Schaefer, vice-president in charge of engineering and manufacturing of the Midvale Co., Nicetown, Philadelphia, and H. B. Knowlton, chief engineer, materials engineering, International Harvester Co., Chicago.

In accordance with the Constitution of the American Society for Metals, additional nominations for any of these posts may be made by written communications addressed to the secretary of the Society and signed by any 50 members. If no such additional nominations are received prior to July 15, nominations shall be closed and at the annual meeting in October 1952 the secretary will cast the unanimous vote of the members for these candidates.

R. L. Wilson

Mr. Wilson, the nominee for president, is a 1921 graduate of Lehigh University. His experience includes six years with the metallurgical departments of the United Alloy Steel Corp. and Central Alloy Steel Corp., after which he served for ten years as a metallurgical engineer for the Timken Steel and Tube Division.

In 1937 he joined the staff of Climax Molybdenum Co., and then served during the war as chief of the constructional steels section of the metallurgical and conservation branch, War Production Board. He rejoined Timken as chief metallurgist in 1944. Mr. Wilson served on the Board of Trustees in 1938-39.

J. B. Austin

James B. Austin, selected by the committee for vice-president, received his degree in chemical engineering from Lehigh University in 1925, and a Ph.D. in physical chemistry from Yale University in 1928. He joined the staff of the research laboratory of United States Steel Corp. in 1928, was made assistant director in 1944, and became director of research for the company in 1946.

Dr. Austin was chairman of the New York Chapter A.S.M. in 1944, and has served on the publications committee and as a trustee for the Society. He gave the Campbell Memorial Lecture in 1946, and in 1941 gave a series of educational lectures which were later published by the Society as "The Flow of Heat in Metals". He has been a trustee for the American Ceramic Society, and is vice-chairman of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, as well as a member of the executive committee of the Institute of Metals Division of A.I.M.E. He is also a member of the chemical warfare committee of the Research and Development Board, Department of Defense.

A. O. Schaefer

Adolph O. Schaefer, nominee for trustee, received his degree in chemical engineering from University of Pennsylvania in 1922. He has been at the Midvale Co. since graduation, starting as research metallurgist. He was active on the Army Ordnance metallurgical advisory committee from 1939-41, and on the gun committee from 1941-44. From 1945 to present he has served on the metallurgical advisory committee for guns. He is a past chairman, past director, and past secretary of the Philadelphia Chapter A.S.M., and has served on the handbook, nominating and publications committee for the Society.

H. B. Knowlton

The second nominee for trustee, H. B. Knowlton, is a chemist and metallurgist by education and a charter member of A.S.M. He engaged in various phases of metallurgical work before joining International Harvester about 25 years ago. Since that time he has served in both manufacturing and engineering departments, and is at present in charge of materials engineering in the general office.

Mr. Knowlton has given a great deal of his spare time to the A.S.M., as chairman of the Milwaukee, Fort Wayne and Chicago chapters, member of the national Metals Handbook Committee, the Educational Committee (chairman, one year), and other committees and subcommittees. He is the author of "Heat Treatment, Properties and Uses of Steel", and co-author of "Machining of Metals", both published by the Society. He has written several convention papers and has been a frequent chapter speaker.

Mr. Knowlton has also been very active in other technical societies and national committees. For the past two years he has given considerable time to the study and development of applications for boron and other alternate steels, and served on several committees which are advisory to the armed services.

W. H. Eisenman

W. H. Eisenman, who was nominated for secretary for the 18th time, is a founder-member of the Society, and has been its national secretary for 33 years. In that time the Society has grown from a nucleus of 200 members to an organization of 82 chapters and more than 20,000 members.

Marcus Grossmann, Past-President Dies

Marcus A. Grossmann, adviser-research planning, United States Steel Co., Pittsburgh, and past-president of the American Society for Metals, died May 21 after a long illness. Dr. Grossmann was the recipient of the Albert Sauveur Achievement Award of the Society at the National Metal Congress in 1949.

Born and raised in Youngstown, Ohio, young Grossmann was attracted to the steel mills early in life, and therefore chose M.I.T. and metallurgy for his schooling. His first research discovery was made prior to World War I while working for Vanadium Corp. of America.

Subsequently he became chief metallurgist for Electric Alloy Steel Co., and then metallurgist for United Alloy Steel Co., which eventually became part of Republic Steel Corp. As recipient of the Sauveur Medal, it is appropriate that he should have pursued his advanced studies under Professor Sauveur at Harvard, where he won his Ph.D. in 1931 with a thesis on "Oxygen in Steel". He has been with the U. S. Steel Co. subsidiaries since that time.

Marcus A. Grossmann

Dr. Grossmann was the author of a famous and lucid text on "Principles of Heat Treatment", now in its 3rd edition. His newest book "The Elements of Hardenability" has just been published by A.S.M. (1952).

Dr. Grossmann is a former Campbell Lecturer, Howe Medalist, and recipient of an Alloy Steel Distinguished Service Award.

Bright Future for Aluminized Steel Predicted by Russell

Reported by F. R. Morral

Kaiser Aluminum & Chemical Corp.

James B. Russell, research metallurgist, division of metallurgical research, Kaiser Aluminum & Chemical Corp., spoke on "The Bright Future for Aluminized Steel" to the Inland Empire Chapter in March.

Mr. Russell reviewed the various methods of coating steel as well as actual and potential applications in various industries (building, electrical, high-temperature equipment, and others). He stated that research he has conducted at the Kaiser laboratories has been in search of aluminum alloys which will give such desired properties as ductility or bending, surface appearance, luster and reflectivity, and corrosion resistance in various atmospheres. The economics of the process of hot dip aluminizing is closely allied with the care exercised in applying the coating. Further, the aluminizing industry is growing, and will have to work hard to compete with galvanizing, and, possibly, tin plate. On the other hand, the quality advantages of aluminized over galvanized products are rapidly becoming recognized.

Several alloying elements improve the characteristics of aluminum coatings on steel. With more than one the effect is often additive. For ductility, silicon and beryllium, singly or combined, are basic. Other elements which improve surface characteristics or other properties are Ti, B, Cr, Mo, Zr, Na, and Zn. Some 28 elements were tried in various combinations, and 260 alloys tested. The ductility of the composite depends mainly on the thickness of the brittle interfacial layer between the base metal sheet and the outside layer of aluminum or aluminum alloy, and, to a lesser extent, on the thickness and composition of the outer coating.

Alloys which produce high, moderate, and low-ductility coatings have been developed, the latter for use on castings, forgings, and other wrought products. The Al-Be-Si type alloys appear most promising where high ductility is required.

At normal temperatures the protection given by aluminum is due mainly to an outside aluminum oxide layer, although under certain conditions the coating appears to give sacrificial protection like zinc. Hot dip aluminized coatings have been applied to low, medium, and high-carbon and alloy steels. To raise the strength properties, the coated steel may be given mechanical treatments, such as wiredrawing, or rolling into thinner sheets. Some heat treatments will help the steel regain the properties lost on hot dipping. Aluminized steel can be brazed, spot welded, and soldered.

The speaker pointed out that only 1000 tons of aluminum were used last year for hot dip aluminized steel, but by 1960 the figure should be close to 80,000 tons annually.

Chapter Chairman L. J. Barker, and Vice-Chairman S. Duran, reported on the Northwest Regional A.S.M. conference in Seattle, attended by the chairmen and vice chairmen of chapters in Seattle, Portland, Spokane, Vancouver, and Richland. The conference was conducted by National Secretary W. H. Eisenman.

National Secretary at Executive Meeting

Shown With W. H. Eisenman, National Secretary (Center Left), at the Executive Committee Meeting of the Puget Sound Chapter in February Are, From Left, Fred R. Young, Chairman, Entertainment Committee; W. L. Slosson, Chairman, Public Relations Committee; Mandel Minsk, Chairman, Executive Committee; E. J. Carlson, Chapter Chairman; W. H. Eisenman; M. E. Parker, Co-Chairman, Educational Committee; C. R. Lundy, Chapter Secretary-Treasurer; B. D. Mills, Jr., Chapter Vice-Chairman; and J. A. Richter, Educational Committee

METAL SHOW NEWS
Dateline: Philadelphia, Oct. 20-24

A month-by-month preview of the National Metal Congress and Exposition

JUNE—Management of American industry is becoming more alert to the "team-coverage" of important events such as the National Metal Exposition at Philadelphia this Fall.

Team-coverage is a reporter's way of saying that several men, each possessing technical knowledge of a specific field, will visit the big Metal Show and study carefully the things that interest them and will be of interest to their employers. They will take a lot of notes, compare and weigh, and evaluate what they see and what they learn. Then they will go home, and, in due time, report to the entire management staff of their respective companies.

This smart process for getting and retaining firsthand knowledge of what went on at the Metal Show is a useful one, used mostly by nonexhibitors, for keeping up with the new, the different, the better trends in the metals industry. However, the idea has moved over into the exhibitor group, too. Frequently a firm displaying products or services has approached the Show with the idea that one or more of its staff on the floor could pick up enough casual information to supply a pretty well-rounded report. But, in the past several years, exhibitor staff men have been pretty busy doing what they came to do—answer questions, and try to sell their products or services to interested visitors. Result? Well, if management wants a good job of coverage done on the Metal Show, it will make sure it gets it—by sending men to do that and only that!

Covering this Show is quite a chore. Suppose a firm makes a pretty good piece of equipment, designed to do a job in one specific field. Maybe not more than three or four similar products will be exhibited on the floor, but maybe a dozen or more pieces of equipment will be shown that can do all, or at least part of, the identical job. Where does that leave management, which expects a reasonably accurate report of what went on?

That's why more and more top management is going in for the team-coverage idea. Smart executives who can't get to the Show themselves are making sure they get the broad, full impact of the Show by assigning several men to report on a lot of things, not just a few.

Because the Metal Show is different from any other industrial exposition—different because it is not concerned with any one field of the metals industry, but rather with every field, it is the place and the time for revelation of processes, techniques, improvements, and adaptations. That's what makes good, reliable, full coverage important for those sales conferences that go on all over the land after a Metal Show closes its doors.

This year more reporters will cover the Philadelphia Show for their firms than ever before—because it makes good sense to see and know what is doing—to see and know what tricks other men have done with metals, with equipment, with processes. In no other way can key personnel be alerted to what is coming and what is present in the great metals industries. C.S.

Analyzes General Problems in Building Of Nuclear Reactors

Reported by R. C. Pocock
Engineering Research Laboratory
Bendix Products Corp.

At the April meeting of the Notre Dame Chapter A.S.M., Frank Foote, of Argonne National Laboratory, discussed the "General Problems of Nuclear Reactors". The discussion was directed toward the metallurgical problems in conjunction with the fabrication and operation of reactors in current use.

The basic phenomenon of nuclear fisson was discovered in 1939. Since then, a considerable industry has been built up utilizing this phenomenon. The basic reaction is the so-called "chain reaction" (U^{235} + 1 slow neutron $\rightarrow$ 2 fission fragments +2.5 fast neutrons + energy). The fast neutrons can be slowed down by passage through a mass of some light element such as carbon or heavy water. These slowed-down neutrons can be used to continue the reaction.

The basic fissionable material is U^{235}, the uranium isotope present to the extent of only 0.7% in natural uranium. U^{238}, which makes up 99.3% of natural uranium, is not itself fissionable. Pure fissionable isotope can be obtained by separation of U^{235} from U^{238} by a diffusion process using the slight difference in atomic weight or by using the excess neutrons of the chain reaction to manufacture fissionable isotopes from fertile isotopes. Thus, fissionable U^{233} can be made from fertile Th^{232}, and fissionable plutonium^{239} from U^{238}. These manufactured isotopes are chemically different from the corresponding fertile isotopes and can therefore be separated by chemical rather than by physical methods.

With careful attention to purity and geometry it is possible to establish the chain reaction using natural uranium. The different elements vary widely in their ability to capture neutrons and those of high capture cross sections, such as boron, cadmium, and the rare earths, must be excluded from the reactor. Such common structural materials as iron and copper alloys can be used only to a very limited extent. Aluminum has a low capture cross section, is corrosion resistant, and is very useful as jacketing material for the chemically reactive uranium and as process tubing for water cooling.

Most of the metallurgical problems in nuclear reactor engineering therefore concern the purification of uranium and moderator materials, and the choice of structural materials of low capture cross section and their use in minimal amounts.

Tremendous amounts of energy are produced by the chain reaction—about 1 megawatt per gram per day of U^{235} destroyed. If the main purpose of a reactor is to produce fissionable isotopes, this energy is ordinarily loosed off at low temperatures and as conveniently as possible. Several recent reactors are designed to operate at such temperatures that useful power can be obtained from the reaction. The experimental breeder reactor is designed to do both. Central station power reactors are receiving a great deal of attention, but it is too early to say whether they can compete economically with coal as fuel.

Speaker Stresses Use Of Critical Alloys For Ordnance Materials

Reported by C. L. Horn
Metallurgist, Hughes Gun Co.

Daniel J. Martin, vice-president in charge of research and engineering for the Hughes Tool Co., Houston, Texas, spoke to the Texas Chapter A.S.M. on the "Critical Alloys in Ordnance Material", at the March meeting.

Cannon have been manufactured successfully from forgings, centrifugal castings, and seamless tubes. The manufacturing method selected depends on the size of the gun and quantity required.

Mr. Martin drew curves to show the correlation between the distribution of stresses and the pressure developed in the gun tube as the result of firing the projectile. The muzzle velocity, as well as physical properties of cannon, has increased considerably since World War I. The increased muzzle velocity causes an increased wear and erosion in the bore of the gun tube and, as a result, more cannon are required to satisfy the demand. Therefore, the amount of alloys necessary to produce the quantity of high-strength guns has also increased.

Daniel J. Martin, Vice-President in Charge of Research and Engineering for the Hughes Tool Co., Houston, Guest Speaker Before the Meeting of the Texas Chapter in March

In an effort to minimize the use of critical alloys and to produce a low-alloy, high-strength gun tube, many variations and chemical analyses have been used and considerable experimental work is being done utilizing additions of boron and rare-earth metals.

After the discussion Dr. Martin answered a number of questions from the floor.

Compliments

To CLARK B. CARPENTER, head of the Colorado School of Mines metallurgy department and well-known consulting metallurgist, on his four-day lecturing tour at the Royal School of Mines in London during April. While in the British Isles, Professor Carpenter attended the national convention of the British Institution of Mining and Metallurgy and the British Industries Fair in London. He also made a tour of Edinburgh University and Oxford.

♦ ♦ ♦

To JAMES BLISS AUSTIN, director of research, U. S. Steel Co., and A.S.M. trustee, on being chosen to present the Edward Orton, Jr., Fellow Lecture at the 54th Annual Meeting of the American Ceramic Society in Pittsburgh. The lecture, a yearly feature of the meeting, will be on "The Thermal Expansion of Nonmetallic Crystals".

♦ ♦ ♦

To H. B. OSBORN, JR., technical director of the Ohio Crankshaft Co., who also handles the company's advertising, on being picked as the "1951 Advertising Manager of the Year" by the t.f. Club of the Cleveland area. The t.f. Club is made up of publishers and space salesmen. It annually selects an advertising manager, who, in the opinion of the judges, achieves the greatest success in accomplishing the objectives he has set up for his company's advertising program.

♦ ♦ ♦

To CLYDE LLEWELYN, vice-president of Bliss & Laughlin, Inc., on his acceptance of a six months Government assignment in Washington to act as chief of the Cold Finished Steel Bar Section, Iron and Steel Division, of the National Production Authority.

♦ ♦ ♦

To EMILIO JIMENO of Spain on his election to a full member of the Spanish Real Academia de Ciencias Exactas, Fisicas y Naturales. This is an outstanding distinction and the elected member is required to give a talk to a solemn reunion of this body. Professor Jimeno talked on "Science and Society".

Mahoning Valley Holds Social Night

Reported by Eugene M. Smith
Development Engineer
Youngstown Sheet and Tube Co.

Members at the February meeting of the Mahoning Valley Chapter A.S.M. celebrated their annual Ladies' Night with a Valentine Party, which attracted 60 couples and proved to be a successful substitute for the Christmas party which was not held this year. Cocktails, sponsored by the Electric Furnace Co., preceded a turkey dinner with all the fixin's. Entertainment was presented by Stan O'Dea, Ohio Works, United States Steel, under the heading of "Sophisticated Humor". The Harmonets provided music for dancing and entertainment.

Oehler Promoted by American Welding

I. A. Oehler, director of metallurgy and research at the American Welding & Manufacturing Co., has recently been promoted to the newly created post of administrative assistant to the executive vice-president. He will continue to direct the company's research activities.

I. A. Oehler

Before Dr. Oehler joined American Welding in 1942, he had formerly been assistant chief metallurgist at Republic Steel Corp. in the Buffalo district. He received his E.E. degree from Rensselaer Polytechnic Institute in 1932, his M.E.E. from the same institute in 1933, and he obtained his D.E.E. degree while studying on a R.P.I. fellowship.

A nationally known authority for his work in welding, Dr. Oehler has recently been elected to the Board of Directors of the American Welding Society. He is a past chairman of the Warren Chapter A.S.M., and is a member of a number of technical societies.

New Films

A 20-minute sound film showing processing features and materials handling applications of the Stevens full automatic barrel plating machine has been prepared by Frederic B. Stevens, Inc.

The film presents a graphic example of the effectiveness of Stevens automatic barrel plating machines as vital links in high-speed production operations. Views taken in a customer's plant show Stevens units as part of a completely automatic material handling and processing installation. Step-by-step analysis of the entire operating cycle is made during the film to show by actual demonstration just what Stevens machines can do to speed flow and processing of work.

Bookings can be made through local Stevens' representatives, or directly through F. B. Stevens, Inc., Detroit 16, Mich.

Philadelphia Hears How Metals Industry Affects The National Economy

Reported by
Charles W. Alexander, 3rd
Metallurgist,
Henry Disston & Sons, Inc.

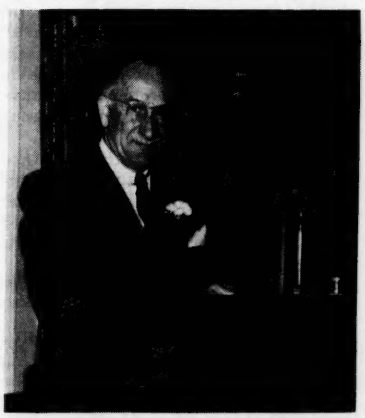
"A President Views the Metal Industry" was the subject of an address by Richard H. DeMott, president, SKF Industries, Inc., before the Philadelphia Chapter A.S.M., and representatives of 75 sustaining member companies on its annual Sustaining Members Night, in February.

Mr. DeMott pointed out that our entire economic structure is dependent upon the basic metals. He illustrated this dramatically by asking his audience to imagine the earth's crust on a sit-down strike, refusing to give up any minerals. Such a dearth of new metal would rapidly collapse our whole existence. Yet, with our rapidly expanding economy and increased war effort, the reserves of many of our basic metals are reaching new lows. To fill demand for these strategic materials, we are increasingly turning to foreign supplies and to the exploitation of "low-grade" domestic ores.

In view of these conditions, Mr. DeMott stated that the opportunities in our economy for substituting plentiful materials, including certain kinds of steel, for scarce materials, are almost unlimited. Many such substitutions have already been made; many more should be made if we are to survive.

Mr. DeMott stated that a company's president is chiefly concerned with placing his company in a better position to operate profitably, today, tomorrow, and in the years to come. He must be aware of existing markets, and be actively interested in the search for new and better materials as well as new markets. He is interested in long-range planning, including research to improve existing products. One solution to the problem, which would benefit the bearing industry, as well as other industries, would be the production of cleaner steel—free from slag inclusions. Projects of this nature will have far-reaching benefits to industry and our economy.

According to Mr. DeMott, there is no field with as great a challenge or potential for contributing to progress as the metal industry.



Richard H. DeMott, President of SKF Industries, Inc., Addresses Philadelphia Chapter on "A President Views the Metal Industry" in February

Minnesota Chapter Hears Current Electroplating Problems Discussed

Reported by Knox A. Powell
Research Engineer
Minneapolis-Moline Co.

"Electroplating and Its Current Problems" was the subject of a discussion given by Allen E. Chester, electroplating specialist for several steel companies, before the March meeting of Minnesota Chapter.

Dr. Chester pointed out that electroplating is divided into sacrificial surface protection, and decorative surface protection. Zinc and cadmium are the chief sacrificial protection materials. They are protective as long as they last, because of higher chemical activity than the materials to which they are applied. Copper, nickel, and chromium are the chief inert plating materials used for decorative surface protection by actual enveloping coverage.

The defense effort has eliminated both nickel and copper for all nonfunctional plating, Dr. Chester stated. Chromium does not readily form a continuous protective surface by itself. Zinc has been tried under chromium, but its chemical action forms muddy "garbage pail" stains that spoil appearance. The sacrificial action of cadmium also stains, but the white compounds of cadmium are soluble in water and can be wiped off to restore appearance.

Silver is now being considered as an undercoat for cadmium. High-zinc brass, however, is the most intriguing undercoat material. The British are promoting a zinc-tin protective coating of seemingly excellent properties. Lacquer coatings and chemical surfaces that take dye would offer excellent surface protection, except for the strong popular preference for bright work.

The discussion brought out the necessity for chemical surface cleanliness for good plate adhesion. The tendency toward the formation of excessive hydrogen contaminant on the surfaces of certain alloys and higher carbon steel during plating accounts for much peeling of chromium. Unsuspected trace elements also affect adhesion, Dr. Chester stated. The little-understood effect of organic compounds on plate formation still offers a challenge to science.

Dr. Chester's talk was preceded by a sound movie illustrating the ionic chemistry of electroplating.

Discusses Corrosion and Other Characteristics of Stainless at Rochester

Reported by John J. Hoffer
Hawk-Eye Works, Eastman Kodak Co.

V. N. Krivobok, of the stainless steel section of International Nickel's Development and Research Division, presented a talk on the recent and timely developments and concepts pertaining to corrosion and other characteristics of "Stainless Steels" before the March meeting of the Rochester Chapter A.S.M. More than 200 men assembled to hear Dr. Krivobok discuss the effects of material shortages on these developments.

Dr. Krivobok covered the matter of substitution in stainless steels, and compared the relative performance of chromium-nickel stainless steels and straight chromium stainless steels. He described the behavior of austenitic chromium - nickel - manganese stainless steel, in which manganese replaces part of the nickel.

Members of the local chapter of the National Association of Corrosion Engineers, of which A.S.M. member G. L. Cox is chairman, were also present for this lecture.

Certificates were awarded at this meeting to the students who had completed the educational course offered by the Chapter. Richard Eisenberg, professor at the University of Rochester, who conducted the series of lectures on "Behavior of Engineering Materials", presented the certificates to 53 students. The large percentage of those who followed the course to completion is proof of the interest in and value of the course.

American Brake Shoe Expands

The American Brake Shoe Co. has recently acquired the former buildings and grounds of the Jumbo Steel Co. in the industrial belt of Azusa, Calif. The plant, when completed as planned, will represent an investment of more than $1,000,000, it was estimated.

Retooling and enlarging the plant's facilities will begin at once.

Austin Attends Inauguration

James B. Austin, A.S.M. board of trustees member, and director of the research laboratory, U. S. Steel, Kearny, N. J., represented the Society at the inauguration of Lewis Webster Jones as president of Rutgers University on May 8.

Charles MacQuigg, Dean Of Engineering at Ohio State University, Dies

Charles E. MacQuigg, 67, dean of engineering at Ohio State University, died April 24th in Columbus.

During over 30 years in numerous types of metallurgical activities, Mr. MacQuigg had a part in extensive research and development work on welds and materials for welding. He was for a long time guiding force of the Tests and Specifications

Charles E. MacQuigg

Committee of the Compressed Gas Manufacturers Association in testing and development of cylinders for transportation of oxygen, acetylene, and other compressed gases. Pioneer work under his direction, especially in the development of high-strength steel, bronze, and stainless steel rods for oxy-acetylene welding, has served as a foundation for many of the recent researches which have been made in this field.

In engineering education, Mr. MacQuigg held an equally prominent place. Shortly after accepting his position at Ohio State in 1938, he was instrumental in developing and establishing there the first complete four-year curriculum in welding engineering leading to a degree.

Prior to his appointment as dean of the college of engineering, Mr. MacQuigg was manager of Union Carbide and Carbon Research Laboratories, Inc. Prior to joining that corporation in 1919, he was head of the department of metallurgy at Pennsylvania State College.

In 1944 Mr. MacQuigg was awarded the James Turner Morehead medal of the International Acetylene Association for "advancing oxy-acetylene processes through metallurgical research, and for leadership in welding engineering education".

At the time of his death, he was chairman of the Ohio Program Commission's highway investigating committee. He was president of the American Society for Engineering Education in 1947-1948. He was the author of many articles on metallurgy and research, and held many patents on steel treatment processes.

C. Laurence Warwick

C. Laurence Warwick, executive secretary, American Society for Testing Materials, and its administrative head since 1919 died suddenly April 23rd.

Mr. Warwick graduated from the University of Pennsylvania in 1909 with a degree in civil engineering. While an instructor and assistant professor at the University, he also served as assistant secretary of A.S.T.M. and in 1919 was appointed secretary-treasurer (chief executive officer). In 1946 he became executive secretary.

He has made many notable contributions to the field of standardization and research in materials and was recognized as an authority on materials. The work he did as head of the specifications branch of the Conservation Division of the War Production Board (World War II), and as head of the Materials Division, resulted in tremendous savings of critical and strategic war materials.

Mr. Warwick has written a large number of technical papers and reports dealing with properties and tests of engineering materials, and especially standardization of specifications and tests.

E. J. Carlyle

E. J. Carlyle, secretary-emeritus of the Canadian Institute of Mining and Metallurgy, and a member of the Montreal Chapter A.S.M., died April 27th in Victoria, B. C.

Mr. Carlyle had retired in 1949 and had resided in Victoria since August 1950.

Founder Member of Boston Chapter Dies

Leslie Hawkridge, a founder of the Boston Chapter, and a member of the Boston Chapter executive committee, died in April. He had been in poor health for the past few years.

Leslie Hawkridge

Mr. Hawkridge was graduated from Dartmouth College in 1911, and studied under Dr. Albert Sauveur at Harvard University. He worked in the annealing and heat treating department at Halcomb Steel Co., and later in the heat treating department of the United Shoe Machinery Corp. He joined Hawkridge Brothers Co. in 1915. He served as a captain in the Signal Corps during World War I, returning to Hawkridge Brothers Co. as vice-president; in 1936 he was made president, in which capacity he served until his death.

Mr. Hawkridge was widely known throughout New England for his practical metallurgical solutions of customers' problems. He was editor of an early publication on toolsteels, "It's Your Fault This Time".

The nominating committee of the Boston Chapter has asked Mr. Hawkridge's son Edwin to take his place on the executive committee. Mr. Hawkridge was a national trustee of A.S.M. in 1928.

Outlines Recent Powder Metallurgy Developments

Reported by Jack V. McMaster

Metallurgist, General Electric Co.

The April meeting of the Columbia Basin Chapter featured Henry H. Hausner, manager of atomic research and development for Sylvania Electric Products Co., and adjunct professor of powder metallurgy at New York University, and at the Polytechnic Institute of Brooklyn. He discussed "Recent Developments in Powder Metallurgy", giving an outline of the history and techniques involved.

In tracing developments in the art of powder metallurgy, Dr. Hausner pointed out that the first book on the subject was published only 10 years ago and that, even now, there are only 10 books on the subject. However, 31 of the 37 American colleges and universities that give metallurgy degrees do offer courses in powder metallurgy. Most of the developments in powder metallurgy in the past 10 years have been made in the United States. This may be attributed to Government sponsorship of projects to develop this art, or to the use of powder metallurgy as a means to an end.

Dr. Hausner's discussion of recent outstanding developments was restricted somewhat by atomic security. Among these developments are the beneficial effects on the density, rate of sintering, and brittleness of beryllium sintered in a vacuum over that sintered in an argon atmosphere.

Another milestone is the infiltration technique developed for the manufacture of compressor plates for jet engines, in which iron powder is pressed to low density, then re-pressed after the addition of molten copper. The copper infiltrates into the pores of the iron compact, thereby increasing the strength.

The third development is the strip rolling of metal powders by passing a stream of powder through slightly heated rolls followed by a furnace anneal, another roll—compression, anneal, roll, and so on. Strips so produced have nearly ideal density and desirable ductility.

Talks on Hard Chromium Plating

W. F. Tompkins, Left, Who Spoke on "Industrial Hard Chromium Plating" at the March Meeting of the Golden Gate Chapter, Chats With B. W. Depew, Chapter Chairman, and W. H. Eisenman, National Secretary A. S. M.

Reported by B. W. Depew
Industrial Heat Treating Specialist
General Electric Co.

"Industrial Hard Chromium Plating" was the subject discussed by W. F. Tompkins, partner in the Industrial Hard Chrome Plating Co., before the March meeting of the Golden Gate Chapter A.S.M.

Mr. Tompkins described the use of hard chromium plating in effecting wear resistance on bearing surfaces, and for rehabilitating worn parts. Items such as crankshafts for aircraft and diesel engines, and journals for turbine and pump rotors have been successfully and economically treated by this method. The speaker emphasized the properties, such as close crystal structure, very low coefficient of friction, good wear resistance, and good oxidation resistance of chromium-plated surfaces. He showed samples and photographs to demonstrate the different points he brought out.

W. H. Eisenman, national secretary A.S.M., a guest for the evening, reported to the members on the recent World Metallurgical Congress.

Fort Wayne Hears Talk On Electric Arc Welding

Reported by A. D. Carvin
Joslyn Mfg. & Supply Co.

William Brooks, field welding engineer for the Indianapolis branch of Lincoln Electric Co. spoke on "Electric Arc Welding" before the Fort Wayne Chapter at the March meeting. To introduce his subject, he covered some of the applications of welding, namely, maintenance work, repair, tool reconditioning, toolmaking, and metal assembly.

Each application of welding has to be considered as a separate problem, and the type of welding rod to be used must be determined by taking many things into consideration, Mr. Brooks pointed out.

He outlined the nomenclature for welding rod of the American Welding Society. AWS numbers indicate tensile strength and composition of the core material of the welding rod.

Welding rod processing was covered briefly, how welding rod is drawn, coated by extrusion, and baked. There are many different types of rod coatings designed for the many applications of welding. Electric furnace rimmed steel is used for welding rod, because it is better than killed steel which gives a porous weld. Also, the chemistry of killed steel is hard to control, and the silicon and aluminum content is undesirably high.

Mr. Brooks covered the subject of tool repair and toolmaking by welding in detail. Items stressed were controlled preheating of the work, proper welding rod, and heat treatment after welding to give desired physical properties.

Selection of welding rod is governed by the application of the tool. These applications were divided into two fields, tools used under abrasive action, and tools used under impact. For abrasive action the welding rod should contain carbides, and for impact conditions the welding rod should contain a tough material, sometimes stainless steel.

Atlantic Steel Expands

The Southeast's largest electric furnace was placed in operation on May 13th by the Atlantic Steel Co. in Atlanta, Ga. The new 60-ton furnace will increase the company's output by more than 50%. The new plant, built at a cost of $2,500,000, occupies a 9-acre plot, adjacent to the company's three 75-ton open-hearth furnaces, rolling, and finishing mills.

George B. Waterhouse of M.I.T. Dies, Was Past President of A.S.M.

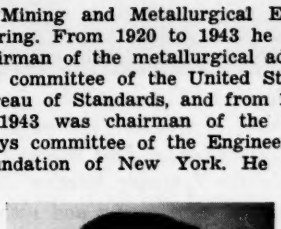
George B. Waterhouse, 68, professor of metallurgy at Massachusetts Institute of Technology, and a consulting engineer, died May 10th in Cambridge, Mass., after a short illness.

Dr. Waterhouse was president of the American Society for Metals in 1937, and was also a director and trustee of the Society at different times. He had distinguished himself by his research work in iron and steels during the 1930's.

A native of Sheffield, England, Dr. Waterhouse received a bachelor of metallurgy degree from Sheffield University in 1901, and took postgraduate work there for two years. He received his doctor's degree from Columbia University in 1907. Sheffield University awarded him an honorary degree in 1937.

Until 1922, except during World War I, he was metallographist, metallurgist and inspection engineer with the Lackawanna Steel Co., leaving to join the staff of M.I.T. During the war he was a member of the 74th Regiment, N. Y. National Guard, and served as a lieutenant.

Dr. Waterhouse was a member of numerous scientific societies, both here and in England. He was a director of the American Iron and Steel Institute, and the American Institute of Mining and Metallurgical Engineering. From 1920 to 1943 he was chairman of the metallurgical advisory committee of the United States Bureau of Standards, and from 1929 to 1943 was chairman of the iron alloys committee of the Engineering Foundation of New York. He also



George B. Waterhouse

has served as special staff consultant for the Office of Production Management for the Steel Division of the War Production Board, and for the Office of Lend-Lease Administration, and consultant for the Office of Foreign Economic Administration.

High-Temperature Alloys Development Discussed in New York

Reported by R. E. Groethe
Corning Glass Works

"High-Temperature Materials" was the subject of the talk presented by N. J. Grant, associate professor of metallurgy, Massachusetts Institute of Technology, before the April meeting of Southern Tier Chapter.

The material presented was extremely enlightening because of its current nature. Rather than restricting the talk to any specific alloy or application, Dr. Grant covered various fields, including current work in each of them.

A recent Swiss development, SAP (sintered aluminum powder), has apparently raised the application temperature of aluminum an additional 300° F. by virtue of its remarkably high-strength characteristics at 600° F., and even at 900° F. SAP is hot pressed, sintered, extruded, extremely fine aluminum flake. The aluminum is very pure (99.5%). This material, which actually involves oxygen as an alloying element, has 80% of the thermal and electrical conductivity, and 80 to 90% of the corrosion resistance of wrought aluminum. It can now be produced in rounds as large as 6 in., can be fabricated after extrusion, and has 23,000 psi. yield strength at 750° F., and at 900° F. has five to ten times the yield strength of the best heat treatable aluminum alloys. Thus, the above data are an indication of the potentialities of this new material.

Molybdenum has, of course, greater load-carrying ability at the higher temperatures than the best nickel, cobalt, or iron-base alloys. Dr. Grant reported that addition of small quantities of various alloying elements to molybdenum raises the recrystallization temperature from 1800 to as high as 3700° F.

Various protective coatings for molybdenum were discussed as a necessity, because of its well-known poor oxidation resistance.

The speaker was optimistic as to the ultimate valuable application of titanium-based alloys because of the relatively high recrystallization temperatures and melting point of pure titanium.

Chromium is also receiving a large amount of attention as the base for a potentially useful alloy system. It might very well be a mistaken impression that chromium is inherently brittle and weak at elevated as well as at low temperatures. Much preliminary work has been done on the chromium-nickel system, specifically in the range 40 to 70% chromium. Such alloys can be cast and machined and will probably be forgeable. Also, they promise to provide attractive high-temperature strength properties in addition to the well-known oxidation resistance furnished by the presence of chromium. Use of chromium-base alloys in the range of 1500 to 1800° F. is being investigated.

Wilson at Fort Wayne Officers' Night

Ralph L. Wilson (Third From Left) A.S.M. Vice-President and Director of Metallurgy, Steel and Tube Division, Timken Roller Bearing Co., Addressed Fort Wayne Chapter on National Officers' Night During the February Meeting. In his talk, Mr. Wilson gave the history of the steam power and petroleum industries. Shown are: A. D. Carvin, member of the executive committee, and P. A. Lauletta, secretary, both of Joslyn Stainless Steels Co.; R. L. Wilson; W. B. Cheney, International Harvester Co., chapter chairman; Andrew Van Echo, Joslyn Stainless Steels Co., and G. R. Hemmeter, General Electric Co., members of the executive committee. (Reported by A. D. Carvin)

Discusses Artificial Tests Vs. Natural Corrosion

Reported by A. S. Vince
Royal Canadian Mint

F. L. LaQue, chief of the corrosion engineering section of the International Nickel Co., delivered a most interesting lecture on "Corrosion Testing" before the Feb. 5th meeting of the Ottawa Valley Chapter A.S.M.

The pitfalls besetting the corrosion engineer with regard to *artificial* corrosion tests designed to increase the rate of corrosion, and the complexities of exposure position under conditions of *natural* atmospheric corrosion were discussed in detail.

The electrode potential of various metals gives very little indication of the degree of corrosion unless supported by other evidence such as polarization characteristics, current densities, relative size of anode and cathode, and local conditions such as aeration of electrolyte.

A relatively simple scale correlating the rust color of the steel sample with the degree of corrosion was also described by Mr. LaQue.

Shows Relationship of Service Performance to Test Behavior of Metal

Reported by J. W. Sands
International Nickel Co., Inc.

"The Relationship Between the Service Performance of Metals and Their Behavior in Tests" was discussed at Past Chairmen's Night of the New York Chapter in April by H. J. French, A.S.M. past president, and vice-president of International Nickel Co., Inc.

When metals are used to provide desired magnetic, electrical, expansion, or other purely physical properties, laboratory results may often be directly translated to service, Mr. French pointed out. However, there are many fields of use in which requirements are sufficiently complex to introduce questions of correlation between tests and actual performance. This is especially true in applications of metals to defeat the destructive actions of different combinations of mechanical stress, of corrosion and erosion, abrasion and wear, the weakening effects of high temperatures, or the embrittling effects of low temperatures.

Even when tests are made as part of research projects in which the objective is to uncover trends without direct relation to a particular environment, the relationship of such work to the ultimate uses or conditions of service can seldom be disregarded.

Mr. French presented various illustrations to emphasize the inadvisability of placing too great reliance upon a single type of test. The hardness test, for example, is indicative of load-carrying ability for a given series of alloys, such as steels, but tells little more. It should usually be supplemented by other tests, such as the tensile or Charpy, to develop a broader and more useful picture.

When sufficient laboratory work has been done, Mr. French concluded, it is often possible, with careful and informed interpretation of data, to get information of direct practical use.

New Names Added to Quarter-Century Club

The following A.S.M. members have been awarded honorary certificates commemorating 25 years' consecutive membership in the Society.

Baltimore—R. Walter Dietrich.

Buffalo—H. J. Cutler, W. A. Wissler, Electro Metallurgical Co.

Canton-Massillon — W. M. Farnsworth, E. R. Johnson, C. H. McCollam, B. H. Miller, V. W. Whitmer, R. L. Wilson. Republic Steel Corp., Timken Roller Bearing Co.—sustaining members.

Chicago—R. W. Anderson, R. W. Blum, W. C. McMillan, B. S. Okner, R. C. Spencer. C. E. Larson & Sons, Inc.—sustaining member.

Cincinnati—E. R. Rothers.

Cleveland—W. E. Benninghoff, T. A. Frischman, J. Graham, H. H. Greene, C. R. Horwedel, W. E. Mansfield, Paul J. McKimm, W. Plamper, P. P. Tarasov. Super Steels, Inc.—sustaining member.

Columbus—C. E. Williams, Lewis S. Colby, P. R. Letz, G. M. Moffat. Bonney-Floyd Co., Buckeye Steel Castings Co., Jeffrey Manufacturing Co., Columbus Bolt & Forging Co.—sustaining members.

Detroit—C. E. Buysse, J. D. Corfield, J. V. Corr, Hugh Dean, Otto E. Goudy, H. E. Moser, J. S. Rodgers, A. H. Smith, W. A. Spindler.

Eastern New York—John P. Fleming.

Golden Gate—B. F. Kline.

Hartford—E. R. Belden, W. D. Fuller, W. D. MacDermid.

Kansas City—E. G. Schaefer.

Lehigh Valley—W. H. Steinecke, L. F. Witmer.

Louisville—A. Hurtgen, R. G. Roshong.

Los Angeles—Martin F. Richter.

Minnesota — Minneapolis Electric Steel Casting Co., Western Alloyed Steel Casting Co.—sustaining members.

Montreal—W. R. Denovan, I. C. Mackie, F. R. Phillips, J. M. Scott.

New Haven—Robert L. Baldwin, W. H. Bradley.

New Jersey—William Mackay, R. L. Rickett.

New York—Robert G. Humphrey, M. A. Mikesh, F. G. Sefing, Nils G. Tholand.

Notre Dame—W. J. Harris.

Oregon—John P. Walsted.

Philadelphia—E. H. Berry, T. R. Brodhead, J. H. Campion, C. L. Eksergian, D. Lewis, H. L. Maxwell, R. R. Moore. Automatic Temperature Control Co., Inc., The Midvale Co.—sustaining members.

Rhode Island—J. M. Olson. Brown & Sharpe Manufacturing Co.—sustaining member.

Saginaw Valley—F. L. Mackin.

Saint Louis—Century Electric Co.—sustaining member.

Southern Tier—R. B. Baker, W. H. Buckingham, W. M. Gortner, A. J. Gude, Ward G. Lincoln.

Springfield—T. D. Jones, W. R. Frazer. Vanadium Alloys Steel Co.—sustaining member.

Washington—G. J. Parke.

West Michigan—J. F. Buckley.

York—A. C. Perry.

National—J. V. Giesler.

Shows Predominating Factors In Corrosion

Shown at the April Meeting of the Mahoning Valley Chapter Are, From Left; E. J. P. Fisher, Metallurgical Consultant and Head of Metallurgical Department, Youngstown College; Robert P. Hill, Electric Furnace Superintendent, Sharon Steel Corp.; Henry A. Holberson, Assistant Vice-President, Youngstown Metal Products Co.; C. P. Larrabee, Research Associate, U. S. Steel Co., Who Spoke on "Steel Corrosion"; and Myron A. Hughes, Chief Process Metallurgist, U. S. Steel Co., Technical Chairman of the Meeting. (Photograph by John W. Holzworth)

Reported by Eugene M. Smith
Development Engineer
Youngstown Sheet and Tube Co.

The predominating influences in corrosion are the effect of environment and steel composition, according to C. P. Larrabee, research associate of U. S. Steel Co., Vandergrift, Pa., who spoke before the April meeting of the Mahoning Valley Chapter A.S.M.

The rate of atmospheric corrosion of steel may vary 350-fold, depending upon environmental conditions at the test site. Even at the same location, corrosion rates can vary 100%, depending upon the weather immediately following exposure, Mr. Larrabee pointed out.

When several steels are exposed in one place at the same time, the comparative corrosion rates reflect the differences in composition. Mr. Larrabee presented numerous slides showing the possibilities of adding copper to offset the detrimental effects of the presence of sulphur in steel. Similarly, addition of nickel and/or chromium has proven beneficial in reducing the corrosion rate. The effects of combinations of alloying addition can be determined only by exposure tests.

Comparative corrosion rates can be estimated by the appearance of rust. The rougher the rust, the greater the corrosion rate. Commercial high-strength low-alloy steels are found to vary from a corrosion rate equivalent to that of copper steel to one-fourth that of copper steel. The alloy composition is the determining factor.

The life of galvanized sheets exposed to the weather depends upon the type of atmosphere and coating thickness. Industrial atmospheres are many times more severe than rural atmospheres. Marine and industrial atmospheres differ somewhat in their relative corrosion attack.

In natural waters, both fresh and salt, which are saturated with oxygen, most steels corrode at the rate of 0.003 to 0.005 in. per year. The use of high-strength low-alloy steels will provide longer life for equivalent thickness when compared with carbon steels. Hence, designers can specify thinner gages if equivalent service life is all that is essential.

Student Group Formed

A student group of the New York Chapter A.S.M. has recently been established at the University Heights division of New York University.

A chapter constitution has been drawn up and officers elected, as follows: Norman H. Katz, president, and George T. Hahn, secretary-treasurer, both of the metallurgy division of the department of chemical engineering at the University.

John P. Neilson, chairman of the department of metallurgy, and chairman of the education and student activities committee of the New York Chapter, has been appointed faculty advisor of this new group.

Eighteen members of the new group started activities with a smoker at the May meeting.

British Columbia Executive Committee

The 1951-52 Officers and Executive Committee of the British Columbia Chapter. Pictured are, from left, front row: W. J. Evans, Evans Importing and Exporting Co., secretary; F. M. Cazalet, B. C. Electric Co. Ltd., chairman; J. A. Underwood, Dominion Oxygen Co., vice-chairman; and W. R. Kerr, treasurer. Last row: W. O. Scott, Dominion Bridge Co. Ltd.; W. J. Chappell, Vivian Engine Works Ltd.; L. A. Head, Marshall-Wells B. C. Ltd.; C. A. Hiltz, McLennan, McFeely & Prior Ltd.; A. S. J. Ellett, Ellett Copper and Brass Co. Ltd.; D. L. Sprung, Canadian Liquid Air Co. Ltd.; J. R. Morris, Dendoff Springs; and R. L. Adams, Ray Adams Machine Works, N. W. W. M. Armstrong, University of British Columbia, and A. D. Harding, Atlas Steels Ltd. were not present when picture was taken. (Photo by Cameo Photos, Vancouver)

Aluminum Forgings Discussed by Welty At Los Angeles

Reported by Rebecca H. Sparling
Consolidated Vultee Aircraft Corp.

More than 200 members of the Los Angeles Chapter A.S.M. heard G. D. Welty of the Aluminum Co. of America discuss light-alloy forgings at the April meeting. Mr. Welty, who is products manager of Alcoa's forging division, discussed the growth of the light-alloy forging industry in the light of his 35 years of experience.

Mr. Welty emphasized the fact that the main objective of the forging process is improvement in quality and strength of aluminum parts, and that forging should not be considered only to obtain desired shape.

The question of close dimensional tolerances in large forgings is essentially decided by cost analysis, Mr. Welty explained. It is often cheaper for the customer to provide draft, and make other concessions to good forging practice, even if additional machining is required to produce the final part, rather than incur the expense of additional dies necessary to attain the same result by forging.

Mr. Welty explained why aluminum is hard to forge, and why it requires heavier equipment than would a similar forging of steel. Aluminum does not flow under the hammer at its forging temperature as easily as steel; it tends to stick to the dies. Moreover, aluminum does not form a loose scale which shells off easily. Aluminum oxide, unlike scale on steel forgings, is very thin, tough, and resistant to oxidation. Therefore, bar stock for aluminum forgings must be cleaner on the surface, and more carefully prepared than steel.

In discussing forge equipment, Mr. Welty remarked that most small aircraft forgings are produced on drop hammers. Although the hammers have the disadvantage of multiple blows which may cause laps or mismatch, they have the advantage of requiring minimum tooling because the operator can make use of his skill and experience. Since aircraft forgings are usually for a small quantity and quick delivery, hammer equipment will continue to occupy an important place in light-alloy forging production.

In recent years, Mr. Welty said, there has been a tendency to shift from hammers to mechanical or hydraulic forging presses. The main reason for this is that some forgings are becoming so large that the dies can no longer be operated in hammers, and such forgings must be made on hydraulic press equipment. Die breakage is not as high on presses as on hammers, but more dies may be required. If close tolerances are specified, the true brains of die design lie in the design of the blockers. The finish die must be made like the customer's drawing, but the blockers must produce a part which has material in exactly the right location before it goes into the finish die. Some designs may require three or even four sets of blocker dies, which makes the cost of tooling so expensive that it is justified only for quantity production.

In discussing the Government's heavy press program, Mr. Welty agreed with the aim of providing the aircraft industry with sources of large forgings and extrusions, but remarked that he was not sure economies would result from efforts to produce forgings to such close tolerances as to eliminate machining. Many operations may be cheaper if performed on machines at the customer's plant rather than attempted by expensive tooling, he stated. As an example, he mentioned that a number of blocker dies are required to produce thin webs. At 25 tons of steel per set of dies, and at $3 an hour for die-sinkers, a set of die equipment may cost $200,000. Final decisions as to what can and should be done for accuracy will depend on a cost analysis.

Mr. Welty's discussion was well illustrated by slides showing various forging hammers and presses, and giving hints on die design.

Metal Institutes Meet in Japan

A general lecture meeting, under the joint auspices of the Iron and Steel Institute of Japan and the Japan Institute of Metals, was held in Tokyo from April 1 to 3. More than 100 technical papers were presented by Iron and Steel Institute, and 300 by the Institute of Metals.

On April 5, 11 Japanese ex-conferees to the World Metallurgical Congress, including Prof. Tokushichi Mishima, met for a reunion. They had a good time talking about their experiences in the U. S.

New England "Research Day" Held in Boston

By L. P. Tarasov

The Boston Chamber of Commerce recently sponsored a "Research Day" to show New England manufacturers how research can create new jobs and industries, and how important the Boston region is as a center for research activities. The theme song was salvation through research, and damnation through lack of it. Top executives of many leading New England firms, and a few from other parts of the country, told of the vital importance of research and development in the growth of their companies, both product and employmentwise.

One of the four panel sessions was devoted to metals. R. S. Reynolds, Jr., president of Reynolds Metals Co., told how his company got started in the field of aluminum production through the aid of consulting geologists and metallurgical engineers at Massachusetts Institute of Technology, which made it possible to locate and make use of entirely new ore bodies. Joint research with the printing press, ink and adhesives industries has made it possible to print in six colors on aluminum foil, and this has opened up new field for foil in the packaging industry.

Research activities were divided by Everett M. Hicks, vice-president of Norton Co., into "technical maintenance", concerned with the improvement of existing products, and "technical advance", which makes it possible for a company to develop and market new products, a necessity if the business is to continue to flourish when its older products become less profitable.

The value of research was pointed out in a different (and inimitable) manner by H. H. Harris, president of General Alloys Co. He castigated much of the foundry industry for its backwardness in research and its application, the result of which is the hesitancy of other industries to find new uses for castings in their products. (Much of what he had to say was published in *Metal Progress*, March 1952).

Richard S. Morse, president of National Research Corp., discussed the commercialization of vacuum melting and casting, which has made it possible to produce parts from hitherto unmanageable metals. Their vacuum melting capacity is now several tons per day. Success in this field is based on research and technical skill, not on low-cost materials. A large and complicated aircraft gun casting made of titanium for Watertown Arsenal was exhibited to show the possibilities of the vacuum technique.

An unusual metal, or a semiconductor to be more exact, was discussed by Lloyd T. DeVore, manager of the electronics laboratory of General Electric Co., in a session on electronics. Germanium rectifiers and transistors that were too small to be visible were "shown" to the audience. One such device can handle 10 watts, another can pass 1000 amperes with an efficiency of 99%.

Two of the four demonstrations put on during another session were of particular interest to metals people. The Polaroid Corp. demonstrated a new application of the developing process upon which the Land camera is based, whereby excellent radiographic prints, either industrial or medical, are available in less than a minute after the X-ray exposure.

The vacuum coating of aluminum on plastics was shown by National Research Corp., the purpose of the process being to increase the sales appeal of plastics. A piece of aluminum-coated cloth which reflects 80% of the heat radiation was also exhibited. The aluminum film, only a few millionths of an inch thick, does not seal the pores of the fabric, so it can be worn just as comfortably as ordinary cloth. Flashlight reflectors are now being made cheaply from ordinary stamped steel coated for smoothness with an organic film which is then vacuum-coated with aluminum. This eliminates a more costly plating operation and conserves strategic materials.

"Research Day" came to a close with the award of citations to 11 New England firms which have created new employment through research. Three of these are A.S.M. sustaining members: National Research Corp. (Boston Chapter), Norton Co. (Worcester Chapter), and United Aircraft Corp. (Hartford Chapter).

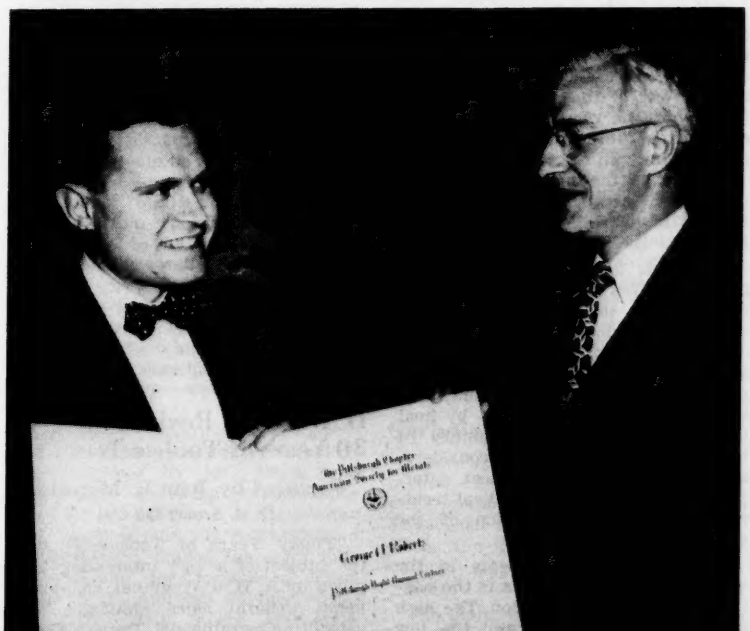
Twenty Years Ago

Quotes From Metals Review
May 1932

"On March 17 the Milwaukee Chapter had the pleasure of being visited by two national officers, A. H. D'ARCAMBAL, president, and W. H. EISENMAN, secretary. During the afternoon R. S. ARCHER [A.S.M. national president 1935-36.], J. FLETCHER HARPER [A.S.M. national president 1926-27] and E. E. WHITE conducted the visitors through the research department of the A. O. Smith Corp. . . Mr. d'Arcambal gave a talk on 'Toolsteels' during the evening meeting. . ."

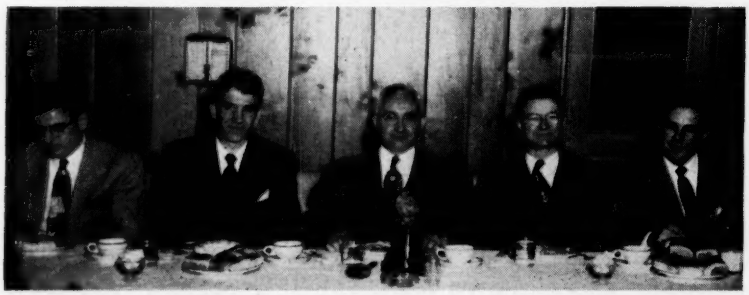
"The Toledo members of the Detroit Chapter have organized into a group. . . A meeting was held April 4 . . . H. W. MCQUAID of the Timken-Detroit Axle Co. [now steel consultant, Cleveland] gave a talk on carburizing and the hardened structures obtained . . ."

Roberts Receives Pittsburgh Certificate



George Roberts (Left), Who Spoke on "Mechanical Properties of Toolsteels" at the First Annual Pittsburgh Night Meeting in February, Accepting Certificate of Appreciation From Max Lightner, Chairman

Speaker Discusses Welding Fundamentals



Richard Lee (Second From Left), Vice-President of Alloy Rods Co., Presented "Fundamentals of Welding Metallurgy" Before the Joint Meeting of the York Chapters, A.S.M. and American Welding Society in February. Shown are, from left: A. M. Roberts, vice-chairman; Mr. Lee; C. A. Sloat, chairman; H. L. Sittler, chairman, Baltimore Chapter A.S.M.; C. H. Pyle, chairman, York Chapter, A.W.S.; and B. S. Norris, program chairman

Reported by A. R. Kunkle
York Corp.

The metallurgy of welding is primarily involved with rates of heat input, the high temperature of the arc, and the extreme speed of the metallurgical reactions, according to Richard Lee, vice-president of Alloy Rods Co., who addressed the joint meeting of the York Chapters of A.S.M. and the American Welding Society in February. The title of his address was "The Fundamentals of Welding Metallurgy".

The tip of the electrode and the crater of the weld are a miniature high-speed electric furnace, Mr. Lee stated. In less than 1 sec., metal from the arc end of the electrode, and alloys from the covering are melted, superheated, mixed, deoxidized, cast into position, and frozen. This can be compared to the production of steel in electric arc furnaces, in which from 2 to 8 hr. is required to melt and refine the steel.

The high localized heat input in the weld area must be taken into consideration in the development of welding procedures and the selection of electrodes. In the welding of mild steel, practically no metallurgical problems are encountered, since the base steel is not hardenable by heat treatment. As the hardenability of the steel increases, more consideration must be given to preheat, interpass temperature, and post heat treatment, and to the selection of the electrodes.

One of the big problems in the welding of stainless steels is the control of carbide precipitation. The high heat input of the arc and the low thermal conductivity of stainless steel combine to allow the weld area to remain hot for an appreciable length of time. If not controlled, carbide precipitation occurs in the heat-affected zone of the base steel adjacent to the weld, with resultant lack of corrosion resistance.

One method of controlling carbide precipitation in stainless steels is to fully anneal the welded structure, redissolving the carbon. Not many stainless weldments can stand being heated to 2000° F. and quenched in water to accomplish the full anneal, so other preventative measures are usually applied.

If sufficient columbium or titanium is added to the steel, stable carbides, which prevent carbon from migrating to the grain boundaries, are formed. Both columbium and titanium-stabilized stainless steels are usually welded with columbium-stabilized electrodes, since columbium can be effectively added to the weld metal from the electrodes, while titanium is oxidized and lost in the arc.

Another method of controlling carbide precipitation in stainless steel welding is to take as much carbon as practically possible out of the steel. Steels and electrodes containing 0.03% max. carbon are available. However, weldments of the 0.03% max. carbon are not recommended for continuous corrosive service at 800° F. and higher, since there is usually a very slight amount of carbide precipitation, which may be detrimental after long-time exposure.

D'Arcambal Reviews 30 Years of Toolsteels

Reported by John L. Morosini
D. A. Stuart Oil Co.

"Thirty Years of Toolsteels" was the subject of a very interesting talk given by A. H. d'Arcambal, vice-president, general sales manager, and consulting metallurgist, Pratt & Whitney Division of the Niles-Bement-Pond Co., West Hartford, Conn., before the Boston Chapter A.S.M. in April.

Mr. d'Arcambal told of his early experience as a metallurgist for Pratt & Whitney, and some of the important changes and controls set up by his department for use of the various types of toolsteels at that time. He traced the improvements made by the various steel companies in the compositions of toolsteels up to the present, and described the advances made in hardening methods, surface treatment, furnace equipment, and testing procedures which are common to this phase of industry today.

Prior to the meeting, some 200 members of the Chapter made a plant visit to the Simonds Saw & Steel Co., Fitchburg, Mass. Small groups were guided through this windowless plant, the first of its kind with completely controlled conditions. The factory, which contains more than five acres under one roof, was inspected from the famous "catwalk", which provides an unobstructed view of production, heat treating, and finishing operations throughout the plant.

Inspection Methods for Ferrous and Nonferrous Composites Explained

Reported by Knox A. Powell
Research Engineer
Minneapolis-Moline Co.

The April meeting of the Minnesota Chapter A.S.M. featured J. F. Cerness, chief metallurgist for the Cleveland Graphite Bronze Co., who gave an illustrated talk on "The Inspection of Ferrous and Nonferrous Composites".

The various commercial methods of making composites of nonferrous material are clad rolling from sandwich ingots, casting on, electroplating, metal spraying, and mechanical keying, according to the speaker. Nonferrous castings may be tested for chemistry, physical properties, and thickness.

Nondestructive tests may be radiographic for varied irregularities like subsurface cracks, blows, alloy segregation, and separation. Minute flaws opening to the surface can be detected by washing with a fluorescent oil (paraffin base), wiping dry, expanding from the pores with heat and observing under black light. Heating a composite part causes defective intermetallic bonds to blister. Supersonic testing discloses subsurface irregularities by intermediate blips on the oscilloscope. Thickness of nonmagnetic overlay can be checked magnetically, or by a Geiger counter measure of reflected radiation absorption through the overlap.

Destructive testing starts with simple chiseling or scalpel-digging tests for adhesion. Metallographic sections disclose structure and bonding at the section locations. Penetration tests disclose irregularities of surface hardness. Chemical stains of sections, such as hydrogen peroxide, show up chemical variations, as from segregation.

Ohio Tri-Chapter Meeting Held in Dayton

Members Who Attended the Ohio Tri-Chapter Meeting Held in Dayton in April Are, From Left; M. Gensamer, Head, Department of Metallurgy, Columbia University; J. B. Johnson, National Trustee, A.S.M.; J. W. Spretnak, Chairman, Columbus Chapter; Ken Barron; O. G. Saunders, Chairman, Dayton Chapter; R. L. Wilson, Vice-President, A.S.M.; O. J. Williams, Chairman, Cincinnati Chapter; V. E. Hense, Chief Metallurgist, Buick Division, General Motors Corp.; and R. Moncrief, Vice-Chairman, Dayton Chapter

Reported by Leland F. House
Armco Steel Corp.

The 14th consecutive annual Tri-Chapter Meeting of the Dayton, Cincinnati, and Columbus Chapters, held in Dayton on April 9, had as its general theme "Recent Developments in Metals".

O. G. Saunders, chairman of the Dayton Chapter, opened the meeting, welcoming visiting chapters, and outlining the program for the day. In the morning, M. Gensamer, head of the department of metallurgy, Columbia University, spoke on "Plastic Behavior of Metals".

After lunch the attending members and their guests heard Ray T. Bayless, assistant national secretary, and Ralph L. Wilson, vice-president A.S.M., discuss the activities of the national office concerning the promotion of metallurgy in the field of education.

Owen J. Williams, chairman of the Cincinnati Chapter, introduced the first speaker of the afternoon session, John Willard, head of market development, Aluminum Co. of America, who spoke on recent developments in the field of "Light Alloys". V. E. Hense, chief metallurgist, Buick Division, General Motors Corp., spoke on "Conservation of Alloys Used in Steels".

The evening session featured John H. Holloman, assistant director of research, General Electric Co., who presented a lecture on "Defects, Diffusion, Distortion, and Dendrites".

All speakers held question and answer sessions after their talks.

French Society to Meet

The French Society of Metallurgy will hold its annual meeting in Paris on Oct. 20 through Oct. 25, 1952. The principal themes of the session will be (1) surface failures and defects, and (2) means for economizing metals in scarce supply; effective use of alloys, substitution of various types, properties and methods of fabrication of materials formerly used, with a view to better utilization of these scarce elements.

Other sessions will be reserved for papers of particular originality and importance. H. Malcor is president of the French Society of Metallurgy, and E. Dupuy is general secretary. Headquarters are at 25, Rue de Clichy, Paris 9, France.

Explains Heat Treatment of Alloy Steel Compositions

Reported by T. J. Phillips
Metallurgist, Alloy Steels Inc.

"The use of boron is not new, as over two million tons of boron steels have been made since late 1930", according to Roy D. Allen, assistant chief metallurgist, Republic Steel Corp., in an address on the "Heat Treatment of New Alloy Steel Compositions", before the Detroit Chapter in January.

The ability of boron to replace several times its own weight in alloys was described by Mr. Allen, who used slides depicting hardenability bands of several boron and nonboron steel compositions for comparison.

The speaker traced the early mistakes in the development of boron steels to an improper balance of alloys, particularly carbon and manganese. These factors, along with poor design of the part, were also found to be responsible for distortion during heat treatment.

F. E. Johnson, chief metallurgist, Timken Detroit Axle Co. was the technical chairman, and conducted a lively question and answer period after the meeting.

Fractography Explained

Reported by R. C. Pocock
Chief Engineer
Engineering Research Laboratory
Bendix Products Division

Frederick Landgraf, Jr., research metallurgist for C. A. Zapffe and Associates of Baltimore, presented a talk on "Fractography" before the May 14th meeting of the Notre Dame Chapter.

Mr. Landgraf explained that fractography is a term applied to fractures and cleavage planes of crystals, and was first used in 1553 in the making of iron. The next record of its use was in 1808 when a meteorite was polished and etched, and an ink micrograph made of it.

This method was apparently forgotten, Mr. Landgraf explained, until revived by C. A. Zapffe in the study of hydrogen embrittlement. Fractography, regularly used in the production of molybdenum, is also a useful tool in the study of crystal structures.

Carboloy Adds Magnet Plant

Construction of a 90,000 sq ft. permanent magnet manufacturing plant costing, with equipment, over $3,500,000, was started in Edmore, Mich., the first part of May, by the Carboloy Department of General Electric Co.

The plant will represent a substantial increase over current manufacturing facilities for the Carboloy Department's Alnico permanent magnets, which are presently being produced in Schenectady, N. Y. They are extensively used in all kinds of military and civilian equipment, including radar, radio, and television receivers.

Saginaw Valley Hears Talk on Marquenching

Reported by R. W. Chase
Senior Project Engineer
A. C. Spark Plug Division

The March 18th meeting of the Saginaw Valley Chapter featured Walter B. Chaney and W. D. Hiatt, of the Fort Wayne Works of International Harvester Co. They presented a talk on "Marquenching", showing some of the possibilities of improving product quality through the use of marquenching and quality control.

The speakers told how it is possible to handle gears made of the leaner alloys on a mass production basis without plugs or fixtures. The marquenching they described is capable of producing gears with a minimum of residual stress, and increased gear life, as proven by dynamometer tests.

Experimental marquenching at the Fort Wayne Works was conducted in a Quench-Master, a machine which permits many adjustments in quenching speeds, and temperature changes in the quenching medium. The oil bath in this machine is controlled by radiant tubes which may heat or cool as required. Quality control principles govern the quenching process and the many factors involved in it.

From this process, International Harvester's Mass Marquenching Tank was designed. This tank is equipped with two 16-in. propellers, each capable of delivering 6000 gal. of oil per min. up the chute. This agitation is essential for uniform mass marquenching.

Weight and size of gears are big problems involved, sections being from ½ to 2 in. The carburizing process used R_x and natural gas. Methane at the header is held at 3%, decreasing to about 1% at the exhaust. The oil bath is held at 400° F.

The following comparison between die-quenched and marquenched gears was given, as determined by actual laboratory tests:

First drive gears, die quenched: Load—260 lb. Results—pits after running 18 hr. First drive gears, marquenched: Load—300 lb. Results—no pits after running 100 hr.

Speaker Describes Various Manufacturing Processes

Reported by H. A. Ball
Chief Inspector
Western Brass Mills

Large valves for power plant applications are expected to give 30 years service. Quality control is a subject of constant study, and includes the use of spectrographic methods for composition, large X-ray equipment, the latest controls on welding and heat treating.

These comments keynoted the talk given before the March 21 meeting of the St. Louis Chapter by Sidney Low of the Chapman Valve Co.

The process of Malcomizing, as developed by Vincent T. Malcolm, director of research at Chapman, was described by Mr. Low. This is a form of nitriding primarily applicable to the stainless steels, from which a case of 0.010 to 0.025 in. can be obtained. In addition to excellent hardness, about 1000 Brinell, the material has excellent wear resistance, as well as greatly improved fatigue properties.

The discussion period following the talk brought out interesting comments on steam tempering. Such treatment was found very advantageous in maintaining improved service on multiple-edge tools.

Hold Panel Discussion on Light Metals

Discussing the Panel Talk on "Light Metals" After the March Meeting of the Boston Chapter Are, From Left: Dow Robinson, Chairman; T. W. Lippert, Titanium Metals Corp., Speaker; John Norton, Professor of Metallurgy, Massachusetts Institute of Technology; and R. L. Templin, Aluminum Co. of American and J. C. McDonald, Dow Chemical Co., Speakers on the Panel

Reported by John L. Morosini
D. A. Stuart Oil Co.

An interesting panel discussion on "Light Metals" was presented to the Boston Chapter at the March 7th meeting. Panel members included: R. L. Templin, assistant director of research and chief engineer of tests, Aluminum Co. of America; John C. McDonald, assistant technical director of the magnesium department, Dow Chemical Co.; and T. W. Lippert, general manager of the Titanium Metals Corp.

Mr. McDonald spoke of the increases that have been made in the production of magnesium over the past few years. He explained the various properties of this metal, as well as its alloying elements. He mentioned some of the commercial uses, such as portable tools, dry cells, reciprocating equipment, and transportation vehicles.

Mr. Templin's talk covered the recent developments of aluminum. At the present time, increased production is needed. He explained the improvements in quality control to secure better properties. From the period 1939 to 1951, he pointed out, the relative cost of aluminum has decreased, whereas for all other metals it has increased.

Mr. Lippert explained the problems involved in manufacturing titanium. The present price of this material is very high, but should follow the usual pattern of any new metal, and, as production increases, prices should decrease.

B. C. Chapter Members Visit Plane Repair Depot

Reported by W. J. Chappell
Vivian Engine Works, Ltd.

The April meeting of the British Columbia Chapter was held at the repair depot of Canadian Pacific Air Lines, Ltd. The tour, limited to 50 members, was a great success and enjoyed by all.

The tour started in the main repair building where planes are fitted for their runs. The group observed a DC-3 undergoing a semimajor overhaul. The wings, tank, and undercarriage were stripped off, and the engines taken down. The group moved on to where the engines were being inspected, watching them go through various cleaning baths, and following through on the rigid inspection given to all parts. Magnaflux machines were used to detect flaws.

The carburetor room and the radio and allied equipment rooms were also visited. The latter department takes care of testing all radio parts. It was pointed out that the reliability of blind flying, beam flying, and communication depends upon proper inspection.

Reviews Testing and Manufacture of Open-Die Forgings at New Haven

Reported by Earle W. Lovering
Metallurgist, Seymour Mfg. Co.

Glenn F. Whiteley, chief metallurgist of the Heppenstall Co., spoke on the subject of "Open-Die Forgings, Their Manufacture and Testing" before the April 17th meeting of the New Haven Chapter.

The three most important requisites for good open-die forgings, according to the speaker, are proper specification, proper forging and heat treating techniques, and adequate testing and inspection.

If the correct specification is given on the order, the forging manufacturer can make the best possible forging at the least cost to the purchaser. The buyer should clearly state the chemistry he requires or the properties needed. When both are called for, it is necessary that the tensile, hardness, and chemistry requirements are compatible. It is impossible to heat treat carbon steel to certain alloy steel properties, or to harden a forging to a high Brinell, and still get annealed steel ductility.

Forging and heat treating techniques must be correct. Definite forging and finishing temperatures must be observed. Forging a piece too cold may produce corner cracks or forging bursts. Forging too hot may produce burned or porous surfaces with resultant rejection. Forging reduction is important, but reduction over and above that needed to produce required grain flow and refinement of centers is not generally necessary.

Heat treating is essential to bring out the best possible properties of a certain analysis steel, or to make a forging easier to machine. When quenching and tempering, it is usually necessary to temper immediately after quenching to avoid cracking.

Adequate testing is required to verify effectiveness of manufacturing processes. Tests may consist of chemical, tensile, impact, or others.

Hardness testing of forgings should be done by the Brinell method. The machine can be built in large sizes to accommodate very heavy forgings. It is quite accurate, and since the Brinell number times 500 equals the approximate tensile strength, conversions are easy. A minimum range of 40 points is required for heat treated forgings, and a maximum value only for annealed forgings.

Nondestructive testing by ultrasonic methods is practical and quite accurate in forgings. By means of high-frequency sound waves, it is possible to detect flakes, pipe, nonmetallics, coarse grains, or cracks in heavy forgings. These defects can be located quite accurately and their nature can usually be predicted by an experienced person.

Acceptance or rejection is not usually possible by ultrasonics alone. Discontinuities, which may be found by ultrasonic testing, must be proved to be harmful defects by conventional means such as macro-etch testing and examination under the microscope. The burden of proof and its cost must be borne by the consumer.

The members of the chapter enjoyed a plant visitation at the Heppenstall Co. in Bridgeport in the afternoon prior to the meeting. They were privileged to see various plant operations and, in particular, were interested in observing the ultrasonic inspection of the Heppenstall forgings.

Ten Years Ago

Quotes From *Metals Review*
May 1942

"The Grand Rapids Group of the Detroit Chapter of the A.S.M. met on April 20 . . . . and voted to petition the Board of Trustees for a charter for a full-fledged chapter to be known as the West Michigan Chapter. RAY T. BAYLESS, assistant secretary from the Cleveland office, was present to guide the arrangements."

"ROBERT M. BIRD, national president of the American Society for Metals in 1925-26, New York district sales manager for Midvale Co., died May 10 of a heart attack in Niagara Falls."

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Birmingham Holds Course On Inspection of Metals

Reported by E. A. Brandler
Electro Metallurgical Co.

The Birmingham Chapter A.S.M. reports "the best lecture series so far presented, as indicated by the highest attendance we have ever had" upon the completion of their 1951-1952 lecture series on the "Inspection of Metals". The six lectures were held in the Engineers Club, Exchange Bldg., Birmingham, on Wednesday nights from Jan. 23 through Feb. 27. The subjects of the lectures were as follows:

Ideals in Steel Making, Tests for Composition, Surface Inspection, by H. A. Caldwell, Chief Metallurgist, Tennessee Coal & Iron Division, U. S. Steel Co.

Hardness Testing, Tensile Testing Including Shear, Soundness Testing, Impact, Fatigue and Creep Testing, by R. W. Sandelin, Metallurgist, Connors Steel Co.

Metallography, A Practical Inspection Tool, by J. R. Villela, Research Associate, U. S. Steel Co. Research Laboratory, Kearney, N. J.

Corrosion Testing, by W. W. Garrett, Electrical Engineer, Corrosion Consultant.

Specifications, by R. W. Mooty, Metallurgist, Assistant to Manager of Metallurgy Department, Tennessee Coal & Iron Division, U. S. Steel Co.

Welding of Metals, by D. H. Curry, Welding Engineer, Chicago Bridge and Iron Co.

How Cutting Fluids Affect Efficiency of Machining Explained

Reported by T. G. Thurston
Sales Engineer
Bryant Industrial Div.

In metal cutting operations the use of a fluid is generally beneficial, although the reason is not always readily apparent. Four main aspects of machinability which are most important in the selection of a cutting oil were listed by Louis H. Sudholz in an address before a joint meeting of the Cleveland Chapter A.S.M., and the American Society of Tool Engineers on March 3. These aspects are tool life, surface finish, tool wear, and power required.

Mr. Sudholz, who is supervisor of development of metal processing lubricants for Socony-Vacuum Laboratories, spoke on "Effect of Cutting Fluids on Machining Efficiency."

Mr. Sudholz briefly reviewed the theory of metal cutting as a basis for understanding the function and application of cutting fluids. At the cutting edge of the tool, the conditions which exist include high local temperature, high pressure, a nascent surface and a highly stressed metal. To be effective, the cutting fluid must possess the following characteristics:

1. Adequate Pressure Resistance—This minimizes the friction between the chip and the face of the tool and prevents periodic seizure.

2. Proper Anti-Weld Characteristics—By maintaining a satisfactory amount of build-up, the cutting edge is protected and the rubbing action of the chip is localized away from the cutting edge.

3. Adequate Lubricity—This minimizes the development of frictional heat, and hence wear, and thus assists in maintaining dimension and finish.

4. Maximum Cooling Ability—By carrying away as much heat as possible and maintaining low tool temperature, tool life is prolonged and dimensional accuracy is maintained.

Friction between chip and tool may be reduced by (*a*) improved tool finish, (*b*) use of low-friction work and tool materials, (*c*) increased cutting speed, (*d*) increased rake angles, and (*e*) use of a cutting fluid.

Cutting fluids may be broadly classified as soluble and nonsoluble. Nonsoluble fluids may consist of mineral oils, fatty oils, or modifications thereof, plus compounds. Soluble cutting fluids may be of either the conventional type (emulsifiers plus mineral oil), or heavy-duty type, which contain special additives.

Generally speaking, soluble oils are preferred to nonsoluble products for high-speed operations and where heat removal is more important than lubrication.

In conclusion, Mr. Sudholz predicted that the development of superior cutting fluids will be accelerated as more exact knowledge of the cutting process becomes available.

Babcock Receives Mahoning Valley Award

Donald E. Babcock (Center) Chemical Metallurgical Engineer, Republic Steel Corp., 1952 Marcus Grossmann Lecturer, Discusses His Talk, "Application of Chemistry to Solution of Problems in Process Chemistry" With H. C. Dunkle (Left), Metallurgical Engineer, Republic Steel Corp., and John A. Ritz, Superintendent, Metal Carbides Corp. (Photo by Henry Holberson)

Reported by Eugene M. Smith
Development Engineer
Youngstown Sheet & Tube Co.

For the third in an annual series of lectures honoring the achievements and metallurgical attainments of Marcus Grossmann, Donald E. Babcock, chemical metallurgical engineer for Republic Steel Corp., was bestowed the highest recognition accorded by the Mahoning Valley Chapter A.S.M. to a local member.

Dr. Babcock's lecture on the "Application of Chemistry to Solution of Problems in Process Chemistry" was delivered at the March meeting of the Chapter. In it he maintained the high standards set by former Grossmann Lecturers, Karl L. Fetters, assistant to the vice-president in charge of operations, Youngstown Sheet and Tube Co., and Thomas E. Eagan, research metallurgist, Cooper-Bessemer Corp.

The subjects covered in Dr. Babcock's address were: Desulphurization with soda ash as proposed by Byers; determination of type of fuel used in the openhearth by analysis of waste gas; use of oxygen potentials for the solution of problems arising in the openhearth and blast furnace; and, progress in use of top pressure in the blast furnace.

In selecting an outstanding member of the Chapter, and thereby commemorating the most nationally prominent former member of the Chapter, Mahoning Valley attempts to recognize formally the oustanding personal contributions made by Dr. Grossmann to metallurgy as a profession.

Dr. Grossmann, a past president of A.S.M., and a native of Youngstown, was adviser-research planning for United States Steel Co., Pittsburgh, until his death in May. (See obituary, p. 6.)

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

W. W. Howell, Technical Abstractor

Assisted by Joseph Enke, Maxine Runkle and Members of the Translation Group

A GENERAL METALLURGICAL

175-A. Steel and the National Economy; a Survey of Current and Future Supplies and Demand. R. M. Shone. *Iron and Steel*, v. 25, Apr. 1952, p. 121-122.
(A4, ST)

176-A. Are Metal Shortages Permanent? Simon D. Strauss. *Mines Magazine*, v. 42, Mar. 1952, p. 45-47, 88, 93.
Emphasis on steel, Cu, and Al.
(A4, ST, Cu, Al)

177-A. Minor Metals are Major Issue. J. L. Bray. *Steel*, v. 130, Apr. 21, 1952, p. 80-82.
General discussion with respect to new sources sought, applications, and future supplies for Ni, Cr, Co, W, Cb, Ta, and Ti.
(A4, Ni, Cr, Co, W, Cb, Ta, Ti)

178-A. Lagooning Purifies Metalworking Wastes. *Steel*, v. 130, Apr. 14, 1952, p. 98-100.
Previously abstracted from "Purification of Wastes in a Metalworking Plant by Lagooning". Charles R. Griffith. *Proceedings of the Sixth Industrial Waste Conference (Purdue Univ.)*. See item 44-A, 1952. (A8)

179-A. Italian Iron and Steel Production; New Cornigliano Plant as Part of Modernization Scheme. *Times Review of Industry*, v. 6, Apr. 1952, p. 84.
(A5, Fe, ST)

180-A. The New Metals. *Analysts Journal*, v. 8, Jan. 1952, p. 95-104.
Verbatim report of speeches presented at the Eastern Regional Conference, New York Society of Security Analysts. General topics are "Titanium"; "Future Markets for Aluminum"; "Other New Metals". (A4, Ti, Al)

181-A. Research in Steel. R. E. Zimmerman. *Analysts Journal*, v. 8, Mar. 1952, p. 19-21.
Need for and development of research in reference to the over-all economy. (A9, ST)

182-A. Metals and Alloys of Today and Tomorrow. H. W. Greenwood. *Engineer*, v. 193, Apr. 18, 1952, p. 540-541.
Rapid increase in variety of materials available to engineers and large increase in metallurgists' knowledge. Effect of impurities in controlling reactions involved in hardening processes. Importance of using purer metals commercially and industrially. Further references to Ti alloys and to powder metallurgy, infiltration and the use of coated powders. (A general)

183-A. Ion Exchange Saves Chromic Acid. *Iron Age*, v. 169, May 1, 1952, p. 152.
Ion exchange is being successfully used by an Eastern aircraft manufacturer to recover valuable Cr and CrO_4 from plant waste.
(A8, Cr)

184-A. Heat Relief in Industry. Bartlett R. Small. *Iron and Steel Engineer*, v. 29, Apr. 1952, p. 71-77; disc. p. 77-83.
Various methods. Ventilators, radiant-heat shielding, and local cooling. Radiation is probably the major cause of discomfort. Table of emissivities of several metals.
(A5, P17)

185-A. Manganese for the Steel Industry. F. W. Boulger and R. C. Buehl. *Journal of Metals*, v. 4, May 1952, p. 468.
Future sources of supply; methods for recovery of Mn from slag.
(A8, Mn, ST)

186-A. U. S. 1952 Slab Zinc Needs Put At 889,000 Tons With 1,018,000 Tons Available for Consumption. C. R. Ince. *Metals*, v. 22, Apr. 1952, p. 7, 17.
(A condensation.)
(A4, Zn)

187-A. Finds Little Excuse for Government Officials Seeking to Compel Use of Copper Substitutes. Louis S. Cates. *Metals*, v. 22, Apr. 1952, p. 8.
Excerpts of remarks at stockholders meeting of Phelps Dodge Corp. (A4, Cu)

188-A. Economical Use of Aluminum. (In German.) K. Specht. *Aluminium*, v. 28, Mar. 1952, p. 76-77.
Nomogram and table permit determination of cost savings due to weight reduction made possible by substitution of common Al alloys for steel or cast iron. (A4, Al)

189-A. Problem of Producing and Selling Tin. (In Portuguese.) Ciro T. De Padua. *Engenharia, Mineracao e Metalurgia*, v. 16, Mar. 1952, p. 413-416.
Attempts at cartelization of the industry, new method of producing tinned sheet, future prospects of the tin market, and influence of Bolivian foreign policy on tin production. (A4, Sn)

190-A. Profitable Chromate Wastes. C. F. Paulson. *Metal Finishing*, v. 50, May 1952, p. 48-50, 56.
A process operating on a commercial scale which eliminates stream pollution and returns the chromate in usable form to the treatment bank. (A8, L14, Cr)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

191-A. "Residues to Metals". *Metal Industry*, v. 80, Apr. 25, 1952, p. 329-330.
L. H. Dowling and Sons, a British firm, claim to have solved the problem of extracting the total metallic content from nonferrous residues. It can treat residues containing over 15% metallics. Test results obtained on some brass residues are tabulated. Appearance of various fractions of original material and concentrates. No details of the process.
(A8, Cu)

192-A. Gold, Silver and Jewellery Industries—Report on Research Progress 1950-51. *Metallurgia*, v. 45, Apr. 1952, p. 195.
Brief summary of metallurgical problems being studied at the research center of the above industries. (A9, Au, Ag, EG-c)

193-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 19, Feb. 1952, p. 51-60; Mar. 1952, p. 115-122; April 1952, p. 175-182.
Begins listing of definitions of metallurgical terms. Feb. issue covers "A"—"Argon"; Mar. issue, "Argon"—"Bingham's Etch"; Apr. issue, "Biotite"—"Browning"; (to be continued.) (A10).

194-A. The Supply and Industrial Applications of Scrap Metals. H. J. Miller. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 24-32; disc., p. 35-39.
Estimates of the world's total store of metals, derived by use of certain assumed recovery factors for individual metals. From statistical data available in both the U. S. and the United Kingdom for Cu, Pb, Zn, Al, and other metals, estimates are made of the probable supply position for scrap, relative to virgin metals. Uses of both old and new scrap, and difficulties involved in utilizing scrap so that the products comply with modern specifications. (A8)

195-A. Treatment of Waste Gases. Walter A. Schmidt. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 183-190; disc., p. 204-210.
Especially as applied to gaseous wastes from the metallurgical industries. The various types of recovery methods, and advantages and disadvantages. 37 ref. (A8)

196-A. The Conservation of Lead. J. Faye. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 194-197; disc., p. 204-210.
Production, resources, uses, and possibilities for substitution of other metals and alloys for Pb.
(A general, B10, Pb)

197-A. The Conservation of Non-Ferrous Metals. Jiri Sequens. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 197-203; disc., p. 204-210.

Surveys various possibilities. (A general, EG-a)

B

RAW MATERIALS AND ORE PREPARATION

160-B. Iron-Ore Beneficiation—Present Practices and Trends. Stephen E. Erickson. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 4-12; disc., p. 12-18.

Includes seven typical flow diagrams (B general, Fe)

161-B. Low-Temperature Coke as a Reactive Carbon. C. E. Lesher. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 19-29; disc., p. 29-36.

Previously abstracted from *Mining Engineering.* See item 195-D, 1950. (D1, B22, Fe)

162-B. A Look at Sweden's Iron and Steel Industry. T. L. Joseph. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 36-43; disc., p. 43.

Previously abstracted from *Journal of Metals.* See item 186-B, 1951. (B general, D general, ST)

163-B. Recent Advances in Sintering-Plant Design and Operation. M. F. Morgan. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 91-103; disc., p. 114-121.

Diagrams and illustrations show principally equipment designed and constructed by Arthur G. McKee and Co., for sintering of iron ores. (B16, Fe)

164-B. Design of a Recent Sintering Plant. C. G. Bigelow. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 103-110; disc., p. 114-121.

Sintering plant installation with a rated capacity of 2400 net tons of sinter a day, consists of two 72-in. by 118-ft. 16-windbox Dwight-Lloyd type machines together with necessary auxiliary equipment. Primary function of the plant is to sinter the current production of flue dust from the blast furnaces, as well as stock dust, filter cake recovered from the blast furnace, gas-washing water, rolling-mill scale, and fine ore. (B16, Fe)

165-B. Nonferrous Sintering Plants. A. A. Nilsen and W. J. Urban. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 110-114; disc., p. 114-121.

See abstract of "Sintering Nonferrous Metals", *Journal of Metals;* item 94-B, 1951. (B16, EG-a)

166-B. Physical Tests and Results on Some Agglomerated Iron Ores. F. M. Hamilton. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 135-140; disc., p. 142-152.

Reviews a portion of a recent AIME paper *(Mining Engineering,* v. 187, Dec. 1950; item 6-B, 1951), plus some additional information obtained since that paper was prepared. Sampling, laboratory-crush and tumbler tests, and laboratory-reducibility procedures and apparatus. Typical data are charted. (B16, Fe)

167-B. Testing of Iron Ores and Agglomerates Related to Blast-Furnace Use. R. J. Morton. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 122-134; disc., p. 142-152.

Work directed mainly to methods of testing iron ores and agglomerates for strength, decrepitation, porosity, and reducibility, in an attempt to develop significant testing procedures. Apparatus is diagrammed and illustrated; data are tabulated and charted. (B22, D7, Fe)

168-B. A Strength Test for Sinter. Reed W. Hyde. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 141-142; disc., p. 142-152.

Method was developed to give comparative strength data by a simple procedure that does not require special testing equipment. It has been used at Sintering Machinery Corp.'s testing plant for some time. (B16, Fe)

169-B. Canada's Chromium Problems; Low-Grade Domestic Ores Investigated. *Chemical Age,* v. 66, Apr. 5, 1952, p. 513-514.

A survey conducted by the Extractive Metallurgy Section, Div. of Mineral Dressing and Process Metallurgy, Mines Branch, Ottawa. (B general, Cr)

170-B. Preliminary Studies on the Biogeochemistry of Iron and Manganese. Harry V. Warren, Robert E. Delavault, and Ruth I. Irish. *Economic Geology,* v. 47, Mar.-Apr. 1952, p. 131-145.

Use in prospecting. Tabular data. (B10, Fe, Mn)

171-B. How to Calculate Power Loads for Thickeners. Roman Chelminski. *Engineering and Mining Journal,* v. 153, Apr. 1952, p. 89-91.

Details are presented and graphically interpreted. (B14)

172-B. Mining and Milling at Reocin, Spain. T. E. Abrey. *Mine & Quarry Engineering,* v. 18, Apr. 1952, p. 117-122.

A detailed survey and analysis with specific reference to mine owned by a Belgian company. Ore worked at present contains Zn, Pb, Fe, MgO, and lime. (B12, B13, Zn, Pb, Fe)

173-B. New Developments in Ore Dressing in 1951. James J. Bean. *Mines Magazine,* v. 42, Mar. 1952, p. 51-52, 68.

Iron ore beneficiation; new types of equipment; cyclone separating process; magnetic separation; flotation plants; sulfur ore treatment; cobalt treatment; and miscellaneous minerals and processes. (B14, Fe)

174-B. Uranium Production in Colorado Plateau Area. Frank H. MacPherson. *Mines Magazine,* v. 42, Mar. 1952, p. 53-54, 88. (B10, B12, U)

175-B. Unprecedented Expansion in the Mining Industry. James K. Richardson. *Mining Engineering,* v. 4, Apr. 1952, p. 351-355.

Brief summary of major developments contemplated or under way in the U. S. minerals field. (B12)

176-B. Manganese: Sources and Beneficiation. *Mining Engineering,* v. 4, Apr. 1952, p. 360.

A brief account of the present status. (B general, Mn)

177-B. Taconites Beyond Taconites. N. M. Levine. *Mining Engineering,* v. 4, Apr. 1952.

Possibilities of using low-grade iron ores, exemplified by a study of deposits in Iron County, Wis. Tentative metallurgical flowsheet. (B10, Fe)

178-B. Radiotracer Studies of the Action of Dithiophosphate in the Selective Flotation of Galena and Sphalerite Using $CuSO_4$ and NaCN. C. M. Judson, A. A. Lerew, R. B. Booth, J. S. Kennedy, and G. L. Simard. *Mining Engineering,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 375-380.

A study of the distribution of dithiophosphate during selective flotation of galena and sphalerite from quartz in a Fagergren machine, using NaCN to depress and $CuSO_4$ to reactivate the sphalerite. Single flotations of galena and sphalerite from quartz were studied. (B14, Pb, Zn)

179-B. Some Dynamic Phenomena in Flotation. W. Philippoff. *Mining Engineering,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 386-390.

A possible mechanism for the attachment of a conditioned mineral particle to a rising bubble has been developed. The mechanism, as distinct from the static equilibrium, accounts for the more difficult flotation of fines and slimes, and supplements the probability calculations of Gaudin and of Sutherland. Tabular data. 22 ref. (B14)

180-B. Nine Steel Firms Active in Six New Iron Ore Ventures. David N. Skillings. *Skillings' Mining Review,* v. 41, Apr. 26, 1952, p. 1-2, 19.

Six large ventures in iron ore, domestic and foreign, appear to be moving the geographical center of iron ore mining eastward in the Western Hemisphere—the Labrador ore fields and the Venezuela ore fields are the new potent lines of force. (B10, ST, Fe)

181-B. The Influence of Gases on the Flotation of Nonsulfide Minerals. (In Russian.) I. N. Plaksin and E. M. Chaplygina. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 21, 1952, p. 451-453.

Various ores and minerals were treated with oxygen, nitrogen, and air before flotation. Results are discussed and charted for quartz, fluorite, calcite, iron oxides, copper ores, etc. (B14)

182-B. Contemporary State of Flotation Theory. (In Russian.) I. N. Plaksin. *Vestnik Akademii Nauk SSSR,* v. 21, Apr. 1951, p. 28-34.

A review and discussion of mineral flotation theory with emphasis on Soviet developments. (B14)

183-B. Alloying Zirconium to Magnesium. W. P. Saunders and F. P. Strieter. *American Foundrymen's Society,* Preprint 52-78, 1952, 10 pages.

Merits of several Zr-containing materials were investigated. Use of a master alloy containing about 40% Zr, balance Mg, appears to possess many advantages over both metallic Zr and Zr salts. Tables and graphs. 58 ref. (B22, Zr, Mg)

184-B. The Tungsten Situation in Montana as a Factor in National Defense. Donald W. McGlashan. *Bureau of Mines and Geology, State of Mon-*

tana, Miscellaneous Contribution 12, 1952, 47 pages.

Resources and detailed economic analysis of prospects for increased utilization of Montana tungsten ores. Tables and graphs. (B10, W)

185-B. Oxidation-Reduction: News in Inorganics. *Chemical Engineering,* v. 59, Apr. 1952, p. 161-168.

Use of oxygen in boosting production of steel and S; hydrazine; ozone; nitrogen tetroxide; production of high pressure, low-cost ammonia; S from H_2S; reduction furnaces; producing the "rare" metals by reduction with hydrogen and metals and by silicothermic and electrolytic reduction; and direct reduction in a fluidized bed. 12 ref. (B22, C general, D general, ST)

186-B. Flotation and Electrostatic Separation of Beach Sands From South Woodburn, N.S.W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Joint Investigation 379, 7 pages.

Zircon and rutile were recovered, in reasonably good yields and grades. (B14, Ti, Zr)

187-B. Concentration of Tin Ore From the Belmont Tin Mine, Torrington District, N.S.W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Joint Investigation 387, June 15, 1951, 5 pages.

Classification, tabling, and magnetic concentration. (B14, Sn)

188-B. Concentration of Tin Ore from Mt. Masson, N.T. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Joint Investigation 393, 4 pages.

Classification, tabling, and magnetic concentration. (B14, Sn)

189-B. The Occurrence of Lead in Blast Furnace Slag at Broken Hill Associated Smelters, Port Pirie, South Australia, and Its Recovery by Flotation. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Joint Investigation 397, July 10, 1951, 12 pages.

Analytical procedures developed, and mineragraphic examination. Flotation and magnetic-concentration test data are tabulated. Economic and technical pros and cons. (B14, A4, Pb)

190-B. Rare Earths Improve Properties of Many Ferrous Metals. Parts 1 and 2. W. E. Knapp and W. T. Bolkcom. *Iron Age,* v. 169, Apr. 24, 1952, p. 129-134; May 1, 1952, p. 140-143.

Use and effects of "Lan-cer-amp". History of comparable additions, and hypotheses in explanation of its behavior. Lan-cer-amp containing more La than regular misch metal is being used as ladle addition in stainless, toolsteel, alloy and electrical steel grades. Not all benefits derived from rare-earth additions can be attributed to S reduction. Effect on N content may be more important. Gives effect on ductility and toughness of Cr-Ni-Mo. Lists properties of rare earths. 28 ref. (B22, ST, EG-g)

191-B. Concentration of Oxide and Silicate Manganese Ores From Siskiyou and Mendocino Counties, Northern California. G. M. Potter. W. G. Sandell, and K. C. Vincent. U. S. Bureau of Mines, Report of Investigations 4849, Mar. 1952, 14 pages.

Results of gravity concentration, flotation, and sintering tests on ores of three types from three distinct districts. (B14, B16, Mn)

192-B. Mineral Dressing Investigation of Titanium Ore From the Christy Property, Hot Springs County, Ark. M. M. Fine and D. W. Frommer. U. S. Bureau of Mines, Report of Investigations 4851, Mar. 1952, 7 pages.

Flotation research on samples of residual brookite ore and a drill-hole composite from the Christy Property showed that high-grade flotation concentrates can be produced. Success of the flotation depends, to a considerable extent, on an adequate preflotation treatment including an alkaline blunge and nearly complete slime removal from the ground ore. The brookite can be activated with a heavy metal salt and floated with a soluble soap. Final concentration of the brookite is effected by cationic flotation in an acid circuit. Possibility of recovery of by-product vanadium. 10 ref. (B14, Ti, V)

193-B. Annual Review of the Mining and Oil Industries in Western Canada. *Western Miner,* v. 25, Apr. 1952.

The entire issue is devoted to articles on various parts of Canada and Alaska with respect to different aspects of mining and oil. (B12)

194-B. The Precision of Basic Technological Indices and Engineering Calculations for Ore-Extraction Processes. (In Russian.) L. I. Baron. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Sept. 1951, p. 1346-1355.

Variations of important indices characterizing extraction and treatment of ores were investigated. Degree of influence of various factors and groups of factors. Precision of various empirical approximations used in the mining industry. Data are charted. 12 ref. (B12)

195-B. Experimental Refractory Bodies of High-Melting Nitrides, Carbides, and Uranium Dioxide. P. Chiotti. *Journal of the American Ceramic Society,* v. 35, May 1, 1952, p. 123-130.

A procedure for the preparation of nitrides and carbides of several metals and preparation of refractory bodies from them. Evidence showing the tendency of Be_3N_2, TaN, and ThN toward instability at high temperatures. The hexagonal structure reported by others for TaN is actually that for Ta_2N. A lattice for Th_2N_3 is proposed. The melting points of ThN, UN, and UC are determined. (B19, C-n)

196-B. Low Base Metal-High Silver Ores Give Better Smelter Returns With Pre-Cyanidation Treatment. R. R. Bryan. *Mining Engineering,* v. 4, May 1952, p. 464-468.

Development of precyanidation flotation by Cia. de Real del Monte y Pachuca, Mexico, and metallurgical results of precyanidation flotation. Evaluation of flotation vs. straight cyanidation, and operating data. Tabular data. (B14, Ag)

197-B. Estimates of Selected World Mineral Supplies by Cost Range. Elmer W. Pehrson. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 2-4; disc., p. 35-39.

Tables compare production rates and estimated reserves of various metals and minerals. (B10)

198-B. Mineral Supplies and Their Measurement (Iron-Manganese). Andre Legendre. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 4-12; disc., p. 35-39.

Reserves of Fe and Mn, the two principal metals used in the iron and steel industry. 12 ref. (B10, Fe, Mn)

199-B. Geographical Factors in the Utilization of the Mineral Resources of Brazil. S. Froes Abreu. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 17-21; disc., p. 35-39.

The greater part of the mineral production in Brazil comes from a narrow strip along the eastern coast. Principal minerals and ores produced, reserves, grades, and geographical conditions favorable or unfavorable to their economic utilization. 14 ref. (B10)

200-B. Mineral Resources of India. M. S. Krishnan. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 67-69; disc., p. 97-103.

Brief review. (B10)

201-B. Lead and Zinc Resources in Sardinia. Mario Carta. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 70-75; disc., p. 97-103.

Includes graphs and tables. (B10, Pb, Zn)

202-B. Metallic Mine Mechanization to Increase Recovery; Mining and Concentrating in Sweden. Sven Dalhammar. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 110-113; disc., p. 166-170.

Advantages of mechanization to get better recovery and higher-grade concentrates. Some sink-float plants are mentioned. Crushing or grinding in iron-ore concentration. The Loewenhielm dewatering device. Examples of the recovery of byproducts include flotation of apatite and flotation of pyrite in both sulfide and iron-ore concentration. (B general)

203-B. New Processes for the Utilization of Low Grade Ores. R. W. Diamond, C. O. Swanson, and B. P. Sutherland. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 140-146; disc., p. 166-170.

Concerned mainly with cost factors. Low-grade ores are divided into two classes; simple ores of low metal content, and complex ores. In the first type, crushing and grinding form an important part of the total cost. The general trend is toward larger-sized units, together with adoption of automatic controls and greater mechanization in handling of materials. In the separation processes, gravity methods are especially suitable. Recent advances in treatment of complex low-grade ores (the second type) are use of induced superficial oxidation, a fluidized bed for roasting and calcination, controlled crystallization of mattes, improved reagents in flotation, and electrostatic separation. 33 ref. (B13, B14, B15)

204-B. New Processes for the Utilization of Low-Grade Ores. John D. Sullivan. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 146-152; disc., p. 166-170.

Tables and graphs show progress in various lines over the years. 16 ref. (B general)

205-B. Economic Mineral Dressing as the Preliminary Condition for Inexpensive Large-Scale Mining; Methods of Utilization of Low-Grade Iron Ores. Ernst Bierbrauer. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 163-165; disc., p. 166-170.

In order to beneficiate the siderite ore of the Styrian Iron Mountain in Austria, a low-cost separation process for coarse ores has been developed. This process is something intermediate between jigging and heavy-media separation. A standard jig is able to treat coarse ores from 40 to 150 mm. in size without raising the normal plunger velocity. (B14, Fe)

206-B. A Note on the Use of Gaseous Oxygen. D. J. O. Brandt. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 176-179; disc., p. 204-210.

Production on a "tonnage" scale, and uses in steelmaking and in manufacture of ferro-alloys. (B22, ST, Fe-n)

207-B. Rare Earths: Their Ores and Their Applications. (In Portuguese.) Othon H. Leonardos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 494-519; disc., p. 519.

Methods of production and properties and application in metallurgy and other branches of science and technology. Special attention is given to Th, Ce, and the monazite deposits of Brazil. Table gives chemical compositions of 49 different rare-earth ores. 39 ref. (B general, EG-g)

208-B. (Book) **North American Combustion Handbook.** 322 pages. North American Mfg. Co., 4455 East 71st St., Cleveland 5, Ohio. $2.00.

A basic reference on industrial heating with liquid and gas fuels. Theory of combustion. Heat transfer and fluid-flow calculations. Equipment selection and operations. (B18)

209-B. (Book) **Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources.** 303 pages. 1951. Department of Economic Affairs, United Nations, New York City.

Series of papers and accompanying discussion, under the broad headings: Mineral supplies and their measurement; the outlook for future discovery; increasing mineral resources by discovery; conservation in mining and milling; conservation in manufacture; conservation by corrosion control; conservation by substitution; and inorganic fertilizers in conservation. Selected papers are separately abstracted. (B general)

C

NONFERROUS EXTRACTION AND REFINING

66-C. Industrial High Vacuum and Its Application to Some Metallurgical Problems. J. P. Baxter. *Australasian Engineer,* Feb. 7, 1952, p. 76-79.

High-vacuum methods and the design problems they pose for the engineer. Examples of vacuum metallurgy. (C25)

67-C. Better Brass Mill Products by Continuous Casting. Edward L. Wolff and Frederick M. Barry. *Materials & Methods,* v. 35, Apr. 1952, p. 94-97.

Continuous-cast brass mill products show outstanding chemical uniformity and structural soundness. (C5, Cu)

68-C. Cobalt Metallurgy at the Union Miniere of Upper Katanga. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, Jan.-Feb. 1952, p. 7-9.

Cobalt metallurgy in Katanga (Belgian Congo) with respect to the development of pyro-metallurgical and hydrometallurgical processes. (C general, Co)

69-C. Refined Aluminum; Fabrication and Applications. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, Jan.-Feb. 1952, p. 17-21.

Production of commercial Al, the principle of the process, improvements made with regard to the composition of the bath, refining of Al scrap, and properties and applications of refined Al. Emphasis is on electrolytic production methods. (C23, Al)

70-C. Laws of the Common Discharge of Ions and the Theory of Electrolytic Refining of Metals. (In Russian.) V. L. Kheifets and A. L. Rotinian. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 21, 1952, p. 423-426.

A theoretical discussion. Comparisons are made with experimental curves for several solutions. 15 ref. (C23)

71-C. Silicothermic Magnesium Comes Back. Elliot Schrier. *Chemical Engineering,* v. 59, Apr. 1952, p. 148-149.

A report on the present status. The process is not competitive with electrolytic Mg, but is being used to meet demands for production. The process is being improved; continuous operation is under study. (C26, Mg)

72-C. Germanium's Electronic Upsurge. Joseph A. O'Connor. *Chemical Engineering,* v. 59, Apr. 1952, p. 158-160, 290.

Historical details, and production of Ge from Zn ore. Includes brief account of beneficiation process. (C general, B14, Ge)

73-C. Arc Melting of Zirconium Metal. H. L. Gilbert, W. A. Aschoff, and W. E. Brennan, II. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 191-193.

In arc-melting Zr metal with a tungsten electrode, W appears in nonuniform amounts throughout the ingot. To elimiante this, use of consumable electrodes of Zr sponge is proposed. The arc is stabilized with a small amount of Mg metal added to the Zr sponge used in making up the electrodes. A water-cooled Cu sleeve is used as a melting section in the arc melting furnace. Melting is done under an inert atmosphere of A or He. Metallographic and radiographic studies show the finished ingots to be sound. 12 ref. (C21, Zr)

74-C. Production at Garfield: World's Largest Copper Smelter. R. Thompson. *Journal of Metals,* v. 4, May 1952, p. 456-459.

Equipment and processes. Current daily production is 775 tons of Cu in anode shapes. (C21, Cu)

75-C. The Cathodic Reduction of Copper Oxide. (In French.) Pierre Jolibois and André Sancelme. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 3, 1952, p. 1007-1010.

The electrolytic reduction of copper oxides was studied. Existence of two new crystalline varieties of Cu, one having the structure of CuO, and the other that of Cu_2O, was established by X-ray methods. (C23, Cu)

76-C. Processing Speculum Metal. (In German.) Joseph Blanderer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Mar. 1952, p. 90-95.

Material consists largely of Cu, Sn, and Sb, plus varying, but low, percentages of Pb. It is a typical byproduct of the smelting of Pb and Sn ores. New process, applied in Germany, by which it is oxidized in a two-step process, then separated into the component metals by a series of chemical operations. (C28, Cu, Sb, Sn, Pb)

77-C. Cyanamid Finds New Way to Get Metal From Ore. *Business Week,* May 17, 1952, p. 52, 54.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952. (C general, B14, Ni, Co, Cu, Mn)

78-C. Chemical Ore Reduction Process May Pay Out in Three Years. *Chemical and Engineering News,* v. 30, May 19, 1952, p. 2104-2105.

New high-temperature, high-pressure, all-chemical process for recovery of Ni, Co, Cu, or Mn from ore or scrap, just announced by Chemical Construction Co., a subsidiary of American Cyanamid. Ore concentrates are made by conventional flotation methods, then leached in H_2SO_4 under pressure to oxidize the sulfur to sulfate. The gangue is filtered out along with the insoluble arsenic compounds and a cation-exchange reaction or cementation step removes the copper salts. The solution is made ammoniacal and reduced with hydrogen under pressure. By altering temperatures and pressures of the reduction it is possible to bring down one metal at a time in order of their appearance in the electromotive series. It is believed impractical to recover any metal above Zn in the electromotive series. Three refineries already are being built to utilize the process. (C general, B14, Ni, Co, Cu, Mn)

79-C. Smelting By-Passed in Metals Revolution. *Chemical Week,* v. 70, May 17, 1952, p. 43-44, 46.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952. (C general, B14, Ni, Co, Cu, Mn)

80-C. Method For Freeing Zirconium of Common Impurities and for Preparing Zirconium Sulfate and Oxide. W. Stanley Clabaugh and Raleigh Gilchrist. *Journal of the American Chemical Society,* v. 74, Apr. 20, 1952, p. 2104-2105.

A method of purification based on the sulfate. (C general, Zr)

81-C. The Kroll Process for Titanium Sponge. *Metal Progress,* v. 61, May 1952, p. 122, 124. (Condensed from "Ductile Titanium").

Previously abstracted from *Metal Industry.* See item 29-C, 1952. (C4, Ti)

82-C. Smelting Aluminium Ores. Evans W. Buskett. *Mine and Quarry Engineering,* v. 18, May 1952, p. 157-160.

The Boyer and Hall process for production of pure Al. (C23, Al)

83-C. Magnesia and Magnesium From Sea-Water. P. Litherland Teed. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. "Mineral Resources", 1951, p. 257-261; disc., p. 265-268.

History of development in Great Britain. Two different processes used, their advantages and disadvantages. Application trends of the metal. (C22, Mg)

84-C. Technique of Melting and Casting Metals and Alloys in a High Vacuum. (In French.) W. Fischer and O. Winkler. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 211-220.

Fields of application, equipment, and the process itself. Diagrams and photographs. (C25, D8)

85-C. Principles Used in the Pyrometallurgical Processes of Lead Refining. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 527-559; disc., p. 559.

Principles of various processes used for eliminating impurities existing in primary and secondary lead. Includes table and a large number of phase diagrams for binary Pb alloys, reproduced from "Metals Handbook" and other sources. 35 ref. (C21, M24, Pb)

86-C. Development of Processes for Extractive Metallurgy of Copper in View of the Possibilities of Their Application in Brazil. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 560-572.

13 references. (C21, Cu)

87-C. Some New Metallurgical Processes for Tin in View of the Possibilities of Their Application in Brazil. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 573-581.

(C general, Sn)

D

FERROUS REDUCTION AND REFINING

204-D. Making Pig Iron Without Coke. D. J. O. Brandt. *Australasian Engineer,* Feb. 7, 1952, p. 111-112, 115, 117, 119, 121, 123.

(D1, Fe)

205-D. Statistical Analysis Becomes of Age—An Example of Analysis of Blast-Furnace Production Data. Donald S. Leckie. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 153-157; disc. p. 157-164.

Surveys various methods of statistical analysis, including use of IBM equipment. (D1, S12, Fe)

206-D. Performance of the Carbon Hearth. H. M. Kraner and K. A. Baab. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 165-167; disc. p. 167-173.

Detailed tabular data on operating results to date, obtained by various blast-furnace operators. (D1, Fe)

207-D. Relative Reducibility of Ores and Agglomerated Materials in Various Stages of Oxidation. Carl Ludwig. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 165-167; disc. p. 180-186.

Concludes, on the basis of experiments, that when the physical structures of fine-particle agglomerates (−100) of the two iron oxides are of similar dimension and packing, magnetite is as easy or easier to reduce than hematite at about 900° C. It appears that particle-size distribution—i.e., close or loose pack—does not influence reaction rate to an appreciable degree when fines (−100 mesh) are compared. Influence of reaction temperature on the relative reducibilities of the two oxides has not been explained theoretically. Data are charted. (D1, Fe)

208-D. Results Obtained From Use of High-Magnesia Slags. L. F. Moore. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 187-193; disc. p. 193-199.

Results obtained from use of high and low-MgO slags in the operation of two blast furnaces of comparable size. Data are tabulated and charted. (D1, Fe)

209-D. Procedure Used in Quenching and Digging Out a Blast Furnace and Some Results. K. C. McCutcheon, W. E. Marshall, and H. C. Barnes. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 200-218; disc. p. 218-227.

Methods followed after completion of an experimental run using pelletized fine magnetite concentrates. (D1, Fe)

210-D. Operation of the Sheffield Steel Corporation's Blast Furnace, Houston, Texas. F. C. Davies. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 228-239; disc. p. 239-243.

Covers two periods during World War II, and from July 10, 1947, to Dec. 31, 1950. Tables, graphs, and illustrations. (D1, Fe)

211-D. The Tunnel Kiln Sponge Iron Process. Parts 1-5. P. E. Cavanagh. *British Clayworker,* v. 60, Dec. 15, 1951, p. 238-239; v. 61, Jan. 15, 1952, p. 274-278; Feb. 15, 1952, p. 310-314; Mar. 15, 1952, p. 345-346; Apr. 15, 1952, p. 30-33.

See abstract of "Direct Reduction Yields Variable Density Steels". P. E. Canavagh. *Iron Age;* items 72-D and 87-D, 1952. (D8, Fe)

212-D. The "Gold" in Silvery Iron. *Business Week,* Apr. 12, 1952, p. 106-108.

Operation and expansion plans at Globe Iron Co., Jackson, Ohio. (D1, Fe)

213-D. High Vacuum Melting; Recent Continental Developments. A. J. Gibbs-Smith. *Iron and Steel,* v. 25, Apr. 1952, p. 141-142.

(D8, ST)

214-D. Bottoms of Open Hearth Furnaces. (In Czech.) Frantisek Prochaska. *Hutnické Listy,* v. 7, Jan. 1952, p. 7-15.

Preparation and repair. Graphs and drawings. (D2, ST)

215-D. Development of and Experiences With Basic Chrome Ore—Magnesite Roofs for Large Tilting Furnaces. (In German.) Werner Lange. *Stahl und Eisen,* v. 72, Mar. 13, 1952, p. 284-287; disc. p. 287.

Experiences with 120-150-ton furnaces from 1941 to date. Suspension of the roof bricks; heating-up schedules; temperature measurement; fuel consumption and its relationship to proportion of hot pig iron charged; cost comparison between silica and chrome ore—magnesite roofs; and metallurgical advantages. (D2, ST)

216-D. Carburization With Oil in an Openhearth Furnace With Regenerative Gas and Air Preheating. (In German.) Erwin Fischer. *Stahl und Eisen,* v. 72, Mar. 13, 1952, p. 288-290.

Because of shortness of coke-oven gas, oil was added during the winter months without putting the gas producers into operation. Cleaned blast-furnace gas was used as carrier gas. Experiments on a 120-ton tilting furnace with all-basic lining and a composite gas of a calorific value of 2200 kg-cal. when charging cold or hot pig iron. (D2, ST)

217-D. Refractory Practice as Applied to Malleable Duplexing. C. W. Meyer. *American Foundrymen's Society,* Preprint 52-24, 1952, 7 pages.

Improvements made in refractory practice by experimenting with various types of tuyeres and melting-zone linings. Design of the forehearth, transfer ladle, and the electric furnace. Their length of life as determined by the different refractories used. (D7, ST)

218-D. Steel Desulphurization With Injected Carbide. S. F. Carter. *American Foundrymen's Society,* Preprint 52-29, 1952, 5 pages.

Method described reduces sulfur in small acid-electric heats from 0.085 to 0.045%, 0.075 to 0.038%, 0.030 to 0.019%, etc. Sulfur removal in basic heats has been accelerated by the same treatment, which involves injection of fine carbide into the furnace bath with inert gas. Cost analysis. (D5, ST)

219-D. Metallurgy and Science. Robert F. Mehl. *American Scientist,* v. 40, Apr. 1952, p. 229-259.

A description for the nonspecialist, of the science of metals and of metallurgical engineering based on an account of the manufacture of alloy steel SAE 4340. Chemical theory of steelmaking and heat treatment. Diagrams, graphs, and photomicrographs. (D general, AY)

220-D. Casting Molds for Steel Ingots. Pat Dwyer. *Foundry,* v. 80, May 1952, p. 192, 194.

Dominion Steel & Coal Corp., Sydney, N. S. offers a solution to the problem of carrying ingots at high temperature from the melting shop to the blooming mill or forge. (D9, ST)

221-D. Some Developments in Open Hearth Charging Machines. H. W. Ball. *Iron and Steel Engineer,* v. 29, Apr. 1952, p. 90-93; disc. p. 93.

A new type hydraulically operated machine made by Morgan Engineering Co., Alliance, Ohio. (D2)

222-D. Cropping Losses Reduced by Electric Hot Topping. Tunis L. Holmes. *Iron and Steel Engineer,* v. 29, Apr. 1952, p. 120-122.

Method developed by the M. W. Kellogg Co. for steel ingots weighing up to 110,000 lb. Power consumption was 30-40 kw-hr. per net ton. Grades of steel have been electrically hot-topped from plain carbon steel through most of the stainless grades, valve steels, die steels, high speed toolsteels and high-temperature superalloys. The increase in yield has averaged between 5 and 8% with many figures showing even greater increases. (D9, CN, SS, TS)

223-D. Effect of Ingot Mold Design on Mold Life. A. Jackson. *Iron and Steel Engineer,* v. 29, Apr. 1952, p. 115-116, 118.

Experiments indicating effect of variables in conditions of use for several types of 10-ton molds. (D9, ST)

224-D. A Gas-Tight Device for Measuring Blast-Furnace Stock Level. D. R. Brown and C. E. Wilson. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 329-330.

Device encloses moving parts in a gas-tight container and is effective on a furnace operating at high top pressure. Diagrams. (D1, ST)

225-D. Aerodynamic Factors Associated With the Wear of Open-Hearth Furnace Roofs. J. A. Leys and E. T. Leigh. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 336-342.

Flow conditions existing in a model of the furnace were investigated. Causes of wear are associated with high-velocity streams, and deposition of slag particles from such streams. Steps to minimize wear. Photographs and diagrams. 16 ref. (D2, ST)

226-D. Open Hearth Rebuild Pro-Program Increases Furnace Availability. J. L. Walton and J. O. Dague. *Journal of Metals,* v. 4, May 1952, p. 465-467.

Program at Bethlehem Steel Co.'s Lackawanna plant. (D2, ST)

227-D. Use of Dolomite Bricks in the Electric-Arc Furnace When Refining With Oxygen. (In German.) Harro Werwch. *Stahl und Eisen,* v. 72, Mar. 27, 1952, p. 341-345; disc., p. 345.

Application of the oxygen lance for refining when melting down scrap. High wear of the furnace lining in the melting of stainless steel having a carbon content of less than 0.1%, from scrap of predominantly high alloy content. Drawbacks of the tar-dolomite hearth. Failure of the hard hearth. Advantages of dolomite brick-walled hearths. Dolomite mortar with a special oil binder. Experiences with experimental walls. (D5, ST, SS)

228-D. Use of Dolomite Bricks in Openhearth and Electric-Arc Furnaces. (In German.) Fritz Gareis. *Stahl und Eisen,* v. 72, Mar. 27, 1952, p. 345-347.

Troubles initially encountered in laying the dolomite bricks on account of shrinkage and infiltration. Trials on stopping ends, pillars, roof and ports. Good behavior in hearths, pillars, and arches of electric-arc furnaces. (D2, D5, ST)

229-D. The Behavior of Zirconium and Titanium in Steels, With Particular Emphasis on the Conservation of Manganese. William W. Austin, Jr. *Blast Furnace and Steel Plant,* v. 40, Mar. 1952, p. 330-334, 344; Apr. 1952, p. 416-420.

See abstract of "Titanium and Zirconium—Emergency Substitutes for Manganese", *Steel,* item 745-Q, 1951. (Q23, Q6, ST, Ti, Zr)

230-D. Multiple Burners in Open Hearth Furnaces. Part I. H. T. Watts. *Industrial Heating,* v. 19, Apr. 1952, p. 660, 662, 664, 666, 668, 670.

Design and operation of burner at Republic Steel Corp.'s Gadsden, Ala. plant. Changing from single to a double gas nozzle apparently resulted in a 10% increase in steel tonnage and a decrease in gas consumption. Detail drawing. (To be continued.) (D2, ST)

231-D. Oxygen in Electric Furnace Steelmaking. *Metal Progress,* v. 61, May 1952, p. 152, 154, 156. (Condensed from "Oxygen Lancing in Electric Arc Steelmaking Furnaces".)

Previously abstracted from *Engineer.* See item 334-D, 1951. (D5, ST)

232-D. Blast Furnace Practice. Raw Materials Problem IX(c). Charles E. Agnew. *Steel,* v. 130, Apr. 21, 1952, p. 98, 100, 103-104, 107; Apr. 28, 1952, p. 84, 87-88, 90.

Apr. 21 installment: Early ironmasters using local ores recognized the importance of stock preparation in the shaft before delivery to the smelting zone. Substitution of Lake ores for native ores and the structural strength of coke led to higher blast furnaces and faster blowing. Advantages of Lake ores are traced to particle-size effects. Apr. 28 installment: Problems connected with use of Mesabi ores, which contain more fines than Old Range ores. Use of concentrated ores, effects on productive capacity and fuel consumption. (To be continued.) (D1, Fe, ST)

233-D. Iron and Steel Making From Low-Grade Ores at the Appleby-Frodingham Works of the United Steel Companies, Ltd. A. Robinson. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 152-159; disc., p. 166-170.

Detailed diagrams and tabular data. Includes ore preparation. (D general, B15, Fe, ST)

234-D. Blast Furnace Acid Burdening Practice. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 160-162; disc., p. 166-170.

Nature of the local Northamptonshire ore and its characteristics in relation to methods of preparation, and procedure in operating the blast furnace. Methods used in adjusting Si, Mn, S, and P to a suitable composition for the steelmaking process. (D1, Fe)

235-D. Conservation in Production of Iron and Steel. Clyde Williams. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 172-176; disc., p. 204-210.

Past progress and future trends in technical developments which aid in conservation of depleted raw materials and in obtaining maximum production possible from present facilities. (D general, ST)

236-D. Ideas on the Future Production of Iron and Steel. Robert Durrer. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 180-182; disc., p. 204-210.

Recommends use of high oxygen instead of atmospheric air both for smelting and for converting. Smelting would be done in a low-shaft furnace. The metal extracted by this method need not be a pig iron in the accepted sense, but merely an intermediate metallic product yielding steel on being converter-blown with high oxygen. The heat produced in this process would be sufficient, if all the intermediate metal were treated in this way, to melt down all the scrap iron at present generally regenerated in the openhearth furnace. (D8, ST)

237-D. Study of the Characteristics of Steel Produced in the Basic Converter With a Pure Oxygen Blast According to a New Austrian Process. (In French.) H. Hauttmann. *Circulaire d'Informations Techniques,* v. 9, Apr. 1952, p. 449-509. (Translated from *Mitteilungen aus der Forschungs- und Versuchsanstalt der vereinigten Osterreichischen Eisen-und Stahlwerke Linz-Donau,* Dec. 1951, 38 pages.)

The raw materials are charged in a 15 or 25-ton converter, the bottom of which contains no hole. The converter being placed in a vertical position, a lance is introduced through which the pure oxygen is blown in under pressure of 15 kg. per sq. cm. This pressure creates sufficient agitation so that the end of the lance need not be immersed in the bath, hence is not subject to the usual rapid deterioration. Diagrams, photographs, tables, and graphs. (D3, ST)

238-D. Use of the Triplex Process in Iron and Steel Production: Cupola, Acid Converter, Electric Arc Furnace. (In French.) M. Sautereau. *Circulaire d'Informations Techniques,* v. 9, Apr. 1952, p. 517-526.

Economic aspects of melting steel in the cupola, of decarburizing the melt in the converter, and then of refining the melt in an electric-arc furnace or of completing the process of melting and refining in an electric-arc furnace. Tabular data. (D7, Fe, ST)

239-D. Pre-Refining by Means of Pure Oxygen of Bessemer Melts of High Silicon Content. Application to Bessemer Melts Produced in the Acid Blast Furnace. P. Leroy. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 231-241.

Problems involved in blast-furnace processing of several French iron ores. Examines critically the various possible solutions and gives data on use of pure oxygen. Blowing technique. Tables and graphs. 23 ref. (D3, ST)

240-D. Production of Low-Nitrogen and Low-Phosphorus Basic Bessemer Steel. (In French.) P. Coheur. *Revue universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 95, Apr. 1952, p. 114-122.

See abstract of "Bessemer Steel Low in Nitrogen and Phosphorus," *Metal Progress;* item 329-D, 1951. (D3, ST)

241-D. Bases of Calculation and Choice of Burden in Openhearth Furnaces For Production of Common Steel. II. (In Portuguese.) *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 471-493.

The theoretical, practical, and economic points of view. Extensive tabular data. (D2, ST)

E

FOUNDRY

271-E. Standards for Rough Chipping and Removing Welds. Dean Van Order. *American Foundryman,* v. 21, Apr. 1952, p. 120-124.

A timestudy system, and a recording minute meter. Diagrams and tabular data. (E24, A6)

272-E. Practical Suggestions for the Building of Wood Patterns. W. H. Siebert. *American Foundryman,* v. 21, Apr. 1952, p. 132-134.

Construction of a pattern for a specific large machine tool casting. Diagrams. (E17)

273-E. Quality Control Program for a Steel Jobbing Foundry. H. H. Fairfield. *American Foundryman,* v. 21, Apr. 1952, p. 135-137.

Application at William Kennedy & Sons Ltd., Owen Sound, Ont. Carbon, alloy, and manganese steels are poured for castings ranging from 1 lb. to 5 tons. (E11, S12, CI)

274-E. Practical Aspects of Olivine as a Molding Material. John Sissener and Bjorn Langum. *American Foundryman,* v. 21, Apr. 1952, p. 138-142.

Properties and performance in steel and iron casting as used in Norway. Technically advantageous for manufacture of Mn and Cr-Ni steel. Chief reason for use is in the presumed diminishing of silicosis risk. Equilibrium diagrams and photographs. 11 ref. (E19, CI)

275-E. Risering Castings. J. B. Caine. *American Foundryman,* v. 21, Apr. 1952, p. 143-149.

Difficulties with use of closely spaced risers required to meet feeding distances. Methods to overcome these difficulties and to enable the foundry to produce castings free from dispersed shrinkage with minimum number of reasonably sized risers and an acceptable yield. Diagrams and graphs. 12 ref. (E22, CI)

276-E. Fifty-Year Reviews. *Foundry Trade Journal,* v. 92, Mar. 15, 1952, p. 9-33, 39-43, 49-55, 57-86.

A series of reviews written for the golden jubilee issue: From the Editor's Viewpoint, V. C. Faulkner;

Five Hundred Years' Ironfounding Crammed Into 50 Years, J. J. Sheehan; Evolution of the Equipment Industry, J. Blakiston; Perpetual Interest of Non-Ferrous Research, G. L. Bailey; Consolidation of Bronze and Brass Founding, F. Hudson; Pipe-Dreams to Practice in Cast Iron Research, J. G. Pearce; Phenomenal Growth in Light Alloys, E. G. West; America Outstripped in Malleable Practice, F. D. Ley; and Cooperation in Steelfounding, F. Rowe. (E general, A2)

277-E. Cut Mold Costs With Cement Sand. N. A. Jeppesen. *Iron Age,* v. 169, Apr. 17, 1952, p. 116-119.

Advantages. (E18)

278-E. Controlled Solidification Cuts Die Finishing Costs. *Iron Age,* v. 169, Apr. 24, 1952, p. 140-141.

Procedure can save 50-75% of costs in finishing of large Kirksite forming dies. Shrinkage rates and warpage can be accurately controlled. Flexible water hose and high-temperature insulation help in casting dies close to finished size. Includes graphical interpretation. (E25)

279-E. Iron and Steel Castings; Production at Sprotborough Foundry. P. McA. Martin and J. A. Cooper. *Iron and Steel,* v. 25, Apr. 1952, p. 117-120.

(E general, CI)

280-E. Producing a Large Gravity Casting. *Light Metals,* v. 15, Apr. 1952, p. 116-117.

(E11, CI)

281-E. Metal Injection: A Reassessment of the Position With Regard to Die-Casting Dies. (Concluded). **Part I, II, III, IV, and V.** H. K. Barton. *Metal Industry,* v. 80, Feb. 22, 1952, p. 149-151; Feb. 29, 1952, p. 171-173; Mar. 7, 1952, p. 187-188; Mar. 14, 1952, p. 205-206; Mar. 28, 1952, p. 243-245.

An analysis of metal flow into dies. Effects of viscous shear, and validity of statement that viscous shear results in the kinetic energy of the stream being partly transformed into heat. Characteristics of the metal stream. Values of constants for the various alloy groups. How flow within the cavity can be controlled by varying the shape, size and location of the gate, or gates, and how flow along the runners can be controlled so as to make the best use of the heat resulting from the degradation of kinetic energy. Tabular data. (E13, CI)

282-E. A Contribution on the Metallic Mould Blowing Reaction. V. Kondic, G. Martin, and K. Bromage. *Metallurgia,* v. 45, Mar. 1952, p. 127-130.

The reaction at the metal-mold interface which gives rise to "blowing" at the surface of a chill casting is essentially one of oxidation of the C in the mold material. It can be treated quantitatively with a good approximation by using the thermodynamic data of substances involved in the reaction. By providing at the interface metals of comparatively higher affinity for O than that of C, the reaction can be reduced and "blowing" completely eliminated. Diagrams and photographs. (E25)

283-E. Core Extraction Forces Required in Pressure Die Casting. W. M. Halliday. *Metallurgia,* v. 45, Mar. 1952, p. 132-134.

Die and operating factors governing scale of gripping pressures between sides of a cored hole and core. Gives a rule whereby such pressures may be estimated at design stage. (E13)

284-E. New H.D.A. Pressure Die Casting Foundry at Slough. *Metallurgia,* v. 45, Mar. 1952, p. 139-140.

Largest British pressure die casting machine, capable of producing castings weighing 30 lb. (E13)

285-E. Non-Flammable Hydraulic Fluid for Die Casting Machines; a Report on Properties and Performance. *Precision Metal Molding,* v. 10, Apr. 1952, p. 46-47, 80, 106.

Deals with Monsanto Chemical Co.'s Pydraul F-9, a phosphate-based material. (E13)

286-E. Prototype Die Castings Produced by Investment Casting for Preliminary Testing and Study. *Precision Metal Molding,* v. 10, Apr. 1952, p. 50-51, 100-101.

Several examples at Kerr Manufacturing Co., Detroit. Aids in styling, selecting proper alloy, etc. (E15)

287-E. Die Castings Replace Sand Castings to Save More Than 60 Percent. *Precision Metal Molding,* v. 10, Apr. 1952, p. 42-43, 102-104.

Evolution from sand casting to die casting in development of oscillograph and penmotor manufactured by Brush Development Co., Cleveland. Zn alloy is used. (E13, Zn)

288-E. Investment Casting Can Cut Costs. R. Warrington. *Precision Metal Molding,* v. 10, Apr. 1952, p. 45, 104-106.

A leaf-type gun sight made of 1035 carbon steel by Adapti Co., Cleveland. (E15, CI)

289-E. New Data on Ductile Cast Iron. *Technical News Bulletin* (National Bureau of Standards), v. 36, Apr. 1952, p. 49-50.

See abstract of "Experimental Production of Nodular Graphite in Cast Iron", Alexander I. Krynitsky and Harry Stern, *Foundry;* items 199-E and 256-E, 1952. (E25, M27, CI)

290-E. Historical Notes on the Foundry Industry in the USSR. (In Russian.) Adolf M. Plesinger. *Hutnické Listy,* v. 7, Jan. 1952, p. 15-19.

Development of the Russian foundry industry. Principal activities of many leading metallurgists. (E general)

291-E. Observations on Dimensional Defects in Sand-Cast Pieces. (In French.) René Chion. *Fonderie,* Jan. 1952, p. 2763-2773.

Nature of the equipment, resistance of the equipment and the mold, quality of the manpower, shrinkage, and forcing. Schematic drawings. (E11)

292-E. Sand for Green Casting of Brass Cocks. (In French.) *Fonderie,* Jan. 1952 p. 2786.

Characteristics of sand recommended. (E18, Cu)

293-E. A Complex Precision Casting. (In French.) *Fonderie,* Jan. 1952, p. 2774-2778.

Production of a steam-heated vat, of high-grade cast iron, intended for the chemical industry. It includes a flange, a cylinder, a convex bottom, five bosses including a center one, a small pipe branch, four grooves connecting the five bosses, four external grooves, and three steel coils for heating. Photographs and diagrams. (E15, CI)

294-E. Heat Flow in Moist Sand. Victor Paschkis. *American Foundrymen's Society,* Preprint 52-4, 1952, 6 pages.

An extension of work described in a 1951 report, to cover the case of an initial moisture content of 6%. Data are charted and tabulated. (E18)

295-E. Veining Tendencies of Cores. *American Foundrymen's Society,* Preprint 52-6, 1952, 5 pages.

Progress report on factors that affect the presence of metal fins, not at the core parting, but on cored surfaces of castings. The study of veining is limited to iron castings. The Committee has established that veining can be produced or eliminated by selection of base sands, binders, metal pouring temperature, degree of ramming, degree of baking, percentage of binders, and, in some cases, moisture. Data are extensively tabulated and charted. (E21, CI)

296-E. Core Boxes From Core Plugs. James N. Mathias. *American Foundrymen's Society,* Preprint 52-7, 1952, 4 pages.

Development of Al core boxes from wood or metal master core plugs. Advantages to the pattern shop previous to obtaining the casting. Suitable pattern equipment furnished by various pattern shops. (E21, Al)

297-E. Solidification of Nodular Iron in Sand Molds. R. P. Dunphy and W. S. Pellini. *American Foundrymen's Society,* Preprint 52-9, 1952, 7 pages.

Experiments in which the mechanism and course of the process was studied on a macro scale, using standard test castings. The course of solidification was followed by observing temperature changes through the casting at its vertical midpoint, using a special thermocouple setup. Data are charted and tabulated; microstructures. (E25, M27, CI)

298-E. Aluminum Sand Casting Defects; Their Identification, Causes and Corrections. Donald A. LaVelle. *American Foundrymen's Society,* Preprint 52-12, 1952, 13 pages.

Illustrates a majority of common defects. Probable causes and suggestions for elimination. (E25, Al)

299-E. Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and Other Properties of Malleable Iron. E. A. Lange and R. W. Heine. *American Foundrymen's Society,* Preprint 52-13, 1952, 12 pages.

The results presented pertain to metal properties produced by holding a molten iron at 2700° F. for 1 hr. under atmospheres developed by CO, CO_2, N_2, water vapor, H_2, and A. Tables and graphs. (E25, Q general, CI)

300-E. Pneumatic Reclamation for Foundry Sands. Clifford E. Wenninger. *American Foundrymen's Society,* Preprint 52-15, 1952, 7 pages.

Laboratory, pilot-plant, and commercial development of an "air-scrubber". Characteristics and economics of a commercial installation. Diagrams, tables, and illustrations. (E18)

301-E. Practical Consequences of Space, Time and Temperature Relations During Casting of Metals. J. S. Abcouwer. *American Foundrymen's Society,* Preprint 52-19, 1952, 5 pages.

Mathematical treatment, making use of a temperature discontinuity at the metal-mold interface, gives a temperature distribution in accord with recently published experimental results. Formula for the dimensioning of risers and heads. (E22, E23)

302-E. Mineral Perlite and Its Use in the Foundry. E. D. Boyle and H. R. Wolfer. *American Founrymen's Society,* Preprint 52-21, 1952, 8 pages.

This volcanic mineral, when puffed up into a flour-like mass by quick heat, is an excellent insulating collar and cover for risers. (E22)

303-E. Air Furnace Refractory Practice in Cupola-Air Furnace Duplexing. William C. Corbeau. *American Foundrymen's Society,* Preprint 52-27, 1952, 3 pages.

At National Malleable & Steel Castings Co., Cleveland. (E10, CI)

304-E. Investment Casting of Aluminum. H. Rosenthal and S. Lipson. *American Foundrymen's Society,* Preprint 52-39, 1952, 6 pages.

Mechanical properties of Al test bars produced by investment casting were found to approximate those obtained by sand casting methods. Tables, graphs, macrographs. (E15, Al)

305-E. Sand Control With Particular Reference to the Prevention of Scabbing. W. B. Parkes. *American Foundrymen's Society,* Preprint 52-42, 1952, 15 pages.

Incidence of scabbing was studied by means of test castings, and results are correlated with certain physical properties of the sand. A variety of sand compositions was evaluated. 13 ref. (E18)

306-E. Melting Iron in a Basic-Lined Water-Cooled Cupola. Wally Levi. *American Foundrymen's Society,* Preprint 52-48, 1952, 14 pages.

Development of experimental procedure and equipment, including basic cupola design. Results of several heats are tabulated. (E10, CI)

307-E. Use of Aluminum Bronze in High Pressure Castings. Thornton C. Bunch and George E. Dalbey. *American Foundrymen's Society,* Preprint 52-54, 1952, 6 pages.

Possibility of substituting Al bronze castings for brass forgings and for gunmetal in certain high-pressure heavy castings. Solidification properties. Radiographs, micrographs, macrographs, and photographs. (E25, Cu)

308-E. Effects of Mold Materials on Leak Tightness and Mechanical Properties of 85-5-5-5 and 81-3-7-9 Alloy Castings. J. G. Kura and L. W. Eastwood. *American Foundrymen's Society,* Preprint 52-55, 1952, 15 pages.

Extensive tabular and graphical data. Micrographs and radiographs. (E19, Q general, Cu)

309-E. Flowability of Foundry Sand. Loris M. Diran, Amos J. Shaler, and Howard F. Taylor. *American Foundrymen's Society,* Preprint 52-60, 1952, 15 pages.

Analyzes concepts of "flowability" and "moldability" of sands. Results of grid analyses show that flow of molding sands under pressure is the result of two different mechanisms: during deformation and in later stages. Flow depends upon type of bond used, shape of the sand grains, and method of loading. Composition effects were also determined. Tables, graphs, photographs, and diagrams. (E18)

310-E. Application of Chills to Increasing the Feeding Range of Risers. E. T. Myskowski, H. F. Bishop, and W. S. Pellini. *American Foundrymen's Society,* Preprint 52-66, 1952, 11 pages.

The length of steel plate and bar castings which can be made sound when directional solidification is aided by use of adequate steel chills was determined radiographically and related to thermal gradient conditions in both the casting and chill. Similar studies with high-conductivity Cu and water-cooled chills show that the added improvement in soundness obtainable by such chills is negligible. Basic effects of chill behavior as related to heat flow and solidification mode. Graphs, tables, diagrams, and radiographs. (E25, E22, ST, Cu)

311-E. Effects of Gating Practice on Leak Tightness of 85-5-5-5 and 81-3-7-9 Alloy Castings. J. G. Kura and L. W. Eastwood. *American Foundrymen's Society,* Preprint 52-67, 1952, 9 pages.

Effects of pouring temperature and melting practice were also determined, and relative susceptibilities of the two alloys to leakage were compared. Diagrams, graphs, tables, and radiographs. (E22, E23, Cu)

312-E. A Study of the Formation of Nodular Graphite. Fredrik Hurum. *American Foundrymen's Society,* Preprint 52-75, 1952, 14 pages.

Various grades of pig iron were remelted in an induction furnace. Sillimanite crucibles were used and the charges varied from 2 to 6 lb. Different methods were used to add Mg and ferrosilicon to the melt. Telescopic test pieces having diameters of 5, 10, 20, and 40 mm. and test bars of 20-mm. diam. were cast in graphite and core-sand molds. Several melts of synthetic cast iron were also made and treated in various ways. Micrographs and diagrams. 11 ref. (E25, CI)

313-E. Metallurgical Blast Cupola. R. Doat and M. A. DeBeck. *American Foundrymen's Society,* Preprint 52-76, 1952, 8 pages.

Cupola developed and operated at Liege, Belgium, for production of good-quality gray iron for pipe spinning, from charges consisting of 90 and even 100% mild steel scrap. The setup resembles a combination small blast furnace, slagging gas producer and cupola. Detailed operating data and advantages. 12 ref. (E10, CI)

314-E. Patterns for High Production Malleable and Steel Foundries. Joseph M. Kreiner. *American Foundrymen's Society,* Preprint 52-77, 1952, 4 pages.

Design, construction, and standardization of pattern and corebox equipment. Patterns are constructed on interchangeable basis. The castings must interchange in an assembly with castings made in eight different foundries. Diagrams. (E17, CI)

315-E. Light Alloy Production. *Automobile Engineer,* v. 42, Apr. 1952, p. 141-142.

Important developments by High Duty Alloys Ltd., in completely new foundry, specifically laid out for pressure die casting. (E13)

316-E. Sand Casting With Croning Process Shell Molds. Richard Herold. *Canadian Metals,* v. 15, Apr. 21, 1952, p. 30-32, 34-35.

Advantages of shell molding which is now used for automobile parts, railroad castings, electrical fittings, radiation and boiler sections, diesel castings, aviation castings, marine castings, plumbing fittings, hand tools, pressure pipe, home utility items, kitchen equipment, water pumps, and fractional-horsepower electric-motor housings. It is particularly well-suited to Al; gray, nodular and malleable Fe; low-lead low-tin bronzes, and high alloy steels. (E16, Al, CI, AY)

317-E. Melting Cast-Iron Borings in Foundry Cupola. *Engineering,* v. 173, Apr. 11, 1952, p. 459-460.

About 15% of the initial weight of an iron casting is removed during machining operations and, very often, a high proportion of the borings or swarf produced is lost because of the difficulty of melting this material economically and satisfactorily. Process in which the swarf is fed directly into the cupola at a point well below the normal charging level and just above the melting zone, where the downcoming coke, limestone and solid metal of the charge prevent the borings from being ejected from the cupola. (E10, CI)

318-E. Melting Cast Iron Swarf in Cupolas. *Engineer,* v. 93, Apr. 11, 1952, p. 503.

See abstract of "Melting Cast Iron Borings in Foundry Cupolas." *Engineering,* item 317-D, 1952. (E10, CI)

319-E. Magnesium Sand Foundry Technology. W. C. Newhams. *Foundry,* v. 80, May 1952, p. 144-149, 362, 364, 366.

Developments in the industry since World War II. Recommendations on melting, molding, gating and risering, and correction of defects. (E18, Mg)

320-E. Operating a Basic Cupola. Sam F. Carter. *Foundry,* v. 80, May 1952, p. 150-153, 250, 252, 254, 256, 259-260.

Experience in commercial operation of a basic-lined cupola. Advantages and disadvantages compared with acid practice, and properties of the metal produced. Tabular data on comparative refractory performance and patching costs, basic mixes with varying slag basicity, special irons made in basic cupola, and properties in various diameter bars (E10, Fe)

321-E. Versatile Coreboxes. Richard H. Harwell and J. H. Schaum. *Foundry,* v. 80, May 1952, p. 154-155, 342.

A set of 14 coreboxes for cylindrical cores was made of wood. They are applicable to a variety of jobs. In many instances, metal may prove to be a more satisfactory material. Design of the boxes. (E21)

322-E. The Nonferrous Cleaning Room. Martin G. Dietl. *Foundry,* v. 80, May 1952, p. 156-159, 276, 278, 280, 284, 286.

Finishing the brass or bronze casting after it has solidified in the mold. (E24, Cu)

323-E. Good Casting Design Can Help Foundry Operations. J. W. Bryant. *Foundry,* v 80, May 1952, p 224, 226.

Problems facing the mechanical designer with respect to economizing on weight and size of castings. (E general)

324-E. How to Mold A Large Aluminum Ring Casting. Frederick H. Palmer. *Foundry,* v. 80, May 1952, p. 262, 266.

(E19, Al)

325-E. Swarf Injector for Cupolas. A. R. Parkes. *Foundry Trade Journal,* v. 92, Apr. 10, 1952, p. 389-392.

Equipment and process developed by Crofts (Engineers), Ltd., Bradford, England. (E10, CI)

326-E. Foundry Mechanization. *Foundry Trade Journal,* v. 92, Apr. 17, 1952, p. 415-416.

Discussion of paper published in *Canadian Metals.* See item 239-E, 1952. (E general)

327-E. Dust Problems in Foundries. *Foundry Trade Journal,* v. 92, Apr. 10, 1952, p. 379-384; Apr. 17, 1952, p. 421-423.

A general discussion by several members at a meeting of Institute of British Foundrymen. (E general, A7)

328-E. A Technique for Eliminating Crucibles in Heating and Melting of Metals. D. M. Wroughton, E. C. Okress, P. H. Brace, G. Comenetz, and J. C. R. Kelly. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 205-211.

Method of heating and melting metals without a crucible, by suspension in space with an electromagnetic field. The required field was generated by applying high frequency a.c. to two coaxial coils connected in series opposition. Stable levitation and heating of various metals in the solid state was obtained between the coils in the vicinity of the common axis, both in air and in a vacuum. Diagrams and photographs. (E10)

329-E. Magnesium Die Casting Is Backbone of Expanding Operation. Gilbert C. Close. *Light Metal Age,* v. 10, Apr. 1952, p. 12-14, 16.

Process for light-weight, engine-driven tools manufactured by McCulloch Motors Corp., Los Angeles. Main products include chain saws, posthole diggers, centrifugal pump, military-target airplane engines, and a new twin-rotor helicopter. (E13, Mg)

330-E. Bibliography of the Die Casting Process. Part VI. (Concluded). Harold Bourassa. *Light Metal Age*, v. 10, Apr. 1952, p. 28. (E13)

331-E. The Shell Molding Process: Advantages; Recent Technical Progress; Outlook. F. L. Church. *Modern Metals*, v. 8, Apr. 1952, p. 28-30, 32-33. (E16)

332-E. Thermal Considerations in Foundrywork. Victor Paschkis. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A32-A46; disc., p. A46-A59.

Previously abstracted from *Institute of British Foundrymen.* See item 395-E, 1951. (E25)

333-E. Synthetic Resin Core Binders; Report and Recommendations of Sub-Committee T.S.30 of the Technical Council. G. L. Harbach, chairman. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A100-A107; disc., p. A107-A112.

Correlates findings resulting from circulation of a questionnaire to a number of foundries. (E18)

334-E. Some Present-Day Practices in Patternmaking. B. Levy. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A113-A120; disc., p. A120-A124.

Previously abstracted from *Institute of British Foundrymen;* item 369-E, 1951. (E17)

335-E. Production of Heavy Castings for Electrical Generating Equipment. N. Charlton. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A125-A133; disc., p. A133-A136.

Previously abstracted from *Institute of British Foundrymen;* item 356-E, 1951. (E11, CI)

336-E. Manufacture of Propellers and Other Castings. C. W. Stewart. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A137-A144; disc., p. A144-A146.

Previously abstracted from *Institute of British Foundrymen;* item 370-E, 1951. (E11, CI)

337-E. Casting Characteristics of Some Aluminium Alloys. D. C. G. Lees. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A170-A182; disc., p. A190-A197.

Previously abstracted from *Institute of British Foundrymen,* item 396-E, 1951. (E25, Al)

338-E. The Hot Blast Cupola. (In Swedish.) Morris Itzel. *Gjuteriet*, v. 42, Mar. 1952, p. 35-42.

Briefly discusses theory. Advantages and disadvantages of the process in comparison with ordinary cold-blast practice. Reviews the most common designs at present in use for preheating the blast. Diagrams. 19 ref. (E10)

339-E. Reduction of Dust in Steelfoundry Operations. W. A. Bloor. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A222-A232; disc., p. A254-A262.

Methods, including sampling and analysis apparatus and procedures. Reviews work of BISRA. (E general, A7)

340-E. Observation and Control of Dust in Foundry Dressing Operations. Part I. Control of Dust. R. F. Ottignon. **Part II. Observation of Dust.** W. B. Lawrie. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A233-A253; disc., p. A254-A262.

Previously abstracted from *Institute of British Foundrymen;* item 427-E, 1951. (E24)

341-E. Mechanical Charging of Cupolas; Survey of Methods in Use and Principles Involved. W. J. Driscoll. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A263-A287; disc., p. A287-A291.

Previously abstracted from *Institute of British Foundrymen;* item 428-E, 1951. (E10, CI)

342-E. Loam and Dry-Sand Moulding in the Jobbing Foundry. D. Redfern. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B1-B8; disc., p. B8-B12.

Procedures and equipment of a typical heavy jobbing shop, where castings ranging from 2 to 40 tons are produced. (E19, CI)

343-E. Chilled-Roll Manufacture. K. H. Wright. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B13-B28; disc., p. B28-B30.

Previously abstracted from *Foundry Trade Journal;* item 88-E, 1951. (E11, T5, CI)

344-E. Core-Blower Application and Operation. G. W. Fearfield. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B31-B38; disc., p. B38-B39.

Previously abstracted from *Foundry Trade Journal;* item 193-E, 1951. (E21)

345-E. Intricate Castings From a Durable Loam Mould. J. Currie. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B50-B62.

Previously abstracted from *Foundry Trade Journal;* item 296-E, 1951. (E19, CI)

346-E. Practical Experiences in Producing Nodular Cast Iron. M. M. Hallett. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B63-B70; disc., p. B70-B73.

Previously abstracted from *Foundry Trade Journal;* item 60-E, 1951. Jan. 4, 1951, p. 3-9; disc., p. 9-12. (E25, CI)

347-E. Loam Moulding of Pump Castings and Impellers. E. Clipson. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B74-B83; disc., p. B83-B84.

Previously abstracted from *Foundry Trade Journal;* item 341-E, 1951. (E11, CI)

348-E. Notes on Cast Iron—Past and Present. E. Longden. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B85-B101; disc., p. B101.

Previously abstracted from *Foundry Trade Journal;* item 325-E, 1951. (E25, CI)

349-E. Moulding and Testing Non-Ferrous Hydraulic Castings. W. Thomson. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B102-B109.

Investigation of various types of test bars and experiments with a "hydraulic" mixture. Specimens are bronzes and Al alloys. (E19, Q general, Cu, Al)

350-E. Straight Cast-Iron Pipes. J. L. Handley. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B124-B129.

Previously abstracted from *Foundry Trade Journal;* item 201-E, 1951. Mar. 15, 1951, p. 275-280. (E11, CI)

351-E. Large Light-Alloy Castings. (In French and German.) J. P. Meister. *Aluminum Suisse*, v. 2, Mar. 1952, p. 67. (E general, Al)

352-E. The Preparation of Cement Forming Sands. (In German.) H. Gries. *Giesserei*, v. 39, Mar. 20, 1952, p. 121-127.

Applicability of synthetic sands in sand casting, as well as economic significance of re-use of old sands. Various types of sand compositions, and their resistance to pressure and their gas permeability. Methods of preparation of new and used sands. Data are tabulated and charted. 12 ref. (E18)

353-E. Gypsum as a Material for Matchplate Preparation. (In German.) K. Schroder. *Giesserei*, v. 39, Mar. 20, 1952, p. 127-130.

Physical properties are charted and discussed. Applicability for above use. (E17)

354-E. Aluminum Castings for Polished and Anodized Parts, Particularly for Metal Fittings. (In German.) Marie Buckeley-Liesegang and August Buckeley. *Metalloberfläche*, v. 6, sec. A, Mar. 1952, p. A33-A41.

Correct application for cast Al alloys. A series of casting defects and their causes; possibilities for eliminating them. Little known surface treatments for metal fittings are suggested. (E25, L general, Al)

355-E. Casting Steel Spokes In Large Iron Wheels. Pat Dwyer. *Foundry*, v. 80, May 1952, p. 291-292.

Practice in American foundries where wheels of various kinds with cast iron rims and hubs, and steel spokes, are cast. (E11, CI)

356-E. Recent Development of Cupola Design With Special Reference to Hot-Blast. Fritz Schulte. *Foundry Trade Journal*, v. 92, Apr. 17, 1952, p. 405-414; Apr. 24, 1952, p. 443-444; disc., p. 444-447.

Survey of performance figures, recently published, for some 500 German cupolas. Effect of blast preheating on theoretical combustion temperature and coke consumption. Various types of recuperators, and the special advantages of combining a single, water-cooled cupola with the recuperator. Considers oxygen addition, and also combining the cupola with a low-frequency induction furnace. (E10)

357-E. Electric Furnace Melting For Steel Castings. John Howe Hall. *Foundry*, v. 80, May 1952, p. 160-161, 318, 320, 322, 327.

Procedure in electric furnace operation. Includes application of the lining, and charging and melting methods. (To be continued.) (E10, ST)

358-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry*, v. 80, May 1952, p. 242, 244.

How different types, shapes, and qualities of scrap affect cupola operations. (To be continued.) (E10, CI)

359-E. Magnesium Die-Casting in a Pacific Coast Shop. Gilbert C. Close. *Machinery* (American), v. 58, May 1952, p. 148-151.

See abstract of "Magnesium Die Casting is Backbone of Expanding Operation", *Light Metal Age*, item 329-E, 1952. (E13, Mg)

360-E. The Peco 10-C Die Casting Machine. H. K. Barton. *Machinery* (London), v. 80, Apr. 24, 1952, p. 728-734.

Built by the Projectile and Engineering Co., Ltd., London, and intended for production of large castings in the higher melting point alloys. As much as 8½ lb. of Al can be handled at one shot. (E13)

361-E. A Note on the Mechanism of Solidification of Horizontal Sand Castings. K. C. Adamson and J. B. Sayers. *Metallurgia*, v. 45, Apr. 1952, p. 163-168.

Process was studied in Al and Al-Zn alloys by temperature measurements, pour-out tests, and examination of macrostructures. Concludes that macrostructure of the type of casting examined is mainly dependent on difference in specific gravity between primary crystallites and liquid melt. Table, graphs, and photographs. 23 ref. (E25, Al)

362-E. Tackling the Pig Iron Shortage: New Method of Charging Borings Into the Cupola. *Metallurgia,* v. 45, Apr. 1952, p. 199-200.

Equipment made by Crofts (Engineers), Ltd., Bradford, England, which feeds borings into the spaces between metal and coke directly above the melting zone. (E10, Fe)

363-E. A Die Casting Replaces a 2-Piece Assembly and Cuts Costs by 76 Per Cent. *Precision Metal Molding,* v. 10, May 1952, p. 25.

Al die-cast wheel bushing used by Durant Mfg. Co., Milwaukee, in their cycle counters. Shows a manufacturing economy and a 50% inventory reduction. (E13, T7, Al)

364-E. Folding Cantilever Arm Assembled From Permanent Mold Castings. *Precision Metal Molding,* v. 10, May 1952, p. 30-32.

Advantages of Al permanent-mold castings. Refers to dental equipment made by Ritter Co., Rochester, N. Y. Copper conduit is also cast in as inserts. (E12, T10, Al, Cu)

365-E. Materials and Methods Currently in Use as Lubricants for Die Casting Dies. *Precision Metal Molding,* v. 10, Mar. 1952, p. 77-81. (To be continued.) (E13)

366-E. Possibility of Use of Light-Alloy Shell Molds. (In French.) *Fonderie,* Mar. 1952, p. 2851-2857.

Economic problems involved in gravity casting of light-alloy molds. Diagrams and photographs. (E11, Al)

367-E. Green Sand Casting of Bronze. (In French.) *Fonderie,* Mar. 1952, p. 2858-2865.

Experiments were made to determine the effects of abnormally high moisture contents and pressures. Diagrams, tables, and photographs. (E11, Cu)

368-E. High-Frequency Baking of Foundry Cores by Capacitance Heating. (In German.) H. Derlong and C. Rauh. *Giesserei,* v. 39, Apr. 17, 1952, p. 179-181.

Method of baking cores with synthetic binders. Physical fundamentals of high-frequency baking. Effect of plate distance and drying time. Water content of the cores. Combinations of baking by high-frequency and infrared radiation. Trials with oil cores. Tables and graphs. (E21)

369-E. (Book) **Manufacturing Processes.** Ed. 2. Myron L. Begeman. 608 pages. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.00.

Foundry practice, pattern work, plastic molding, powder metallurgy, hot and cold working of metals, heat treatment and welding, measuring instruments, cutting tools, machines, and their accessories. (E general, G general, H general, J general, K general)

F

PRIMARY MECHANICAL WORKING

121-F. More Forging With Radiant Furnaces at Oldsmobile Plant. *Automotive Industries,* v. 106, Apr. 15, 1952, p. 54-56, 82.

Barrel-type furnace for handling carbon steel billets. (F21, CN)

122-F. Turbine Blades in Half the Time. Richard E. Stockwell. *Aviation Age,* v. 17, Apr. 1952, p. 40-41.

The Omes upsetting machine pushes a bar stock back onto itself by 30-50 diameters and cuts turbine blade production in half. (F22, ST)

123-F. Behind the Venetian Blind—Aluminum Strip Rolled From Continuously Cast Bar. J. L. Hunter and R. A. Quadt. *Iron Age,* v. 169, Apr. 10, 1952, p. 118-120.

Hunter Douglas machine for continuously casting Al and its alloys into horizontal bars 55 ft. or longer produces cast bars that are subsequently hot rolled to strip without scalping or edge trimming. Surface and edge quality is of such order that scarfing operations considered normal in the Al wrought industry are not necessary. Metallurgical soundness and uniformity are at least equivalent to commercial material. (F23, C5, Al)

124-F. Wax Filamented Model Billets Aid Study of Material Flow. J. L. Holmquist. *Product Engineering,* v. 23, Apr. 1952, p. 158-163.

Displacement and change of shape of colored wax filaments in a wax billet show how material flows in various stages of the Mannesmann process. Analysis of observations is presented in terms of the type and amount of deformation the material is subjected to in the rolling and piercing operation. Diagrams and illustrations. (F23, Q24)

125-F. Experts Outline Factors in Forging. Thomas Gialdini. *SAE Journal,* v. 60, Apr. 1952, p. 69-70.

Questions and answers in panel discussion on forging held at SAE National Tractor Meeting, Milwaukee, Sept. 10, 1951. (F22)

126-F. The Art of Anchor Forging. C. D. Linnenbank. *Steel Processing,* v. 38, Apr. 1952, p. 167-171, 205.

The function of an anchor and describes the three major types in use today. (F22, ST)

127-F. What's New in Forging Equipment. Part I. Hammer Designs Show Trend. Part II. John C. McComb. *Steel Processing,* v. 38, Mar. 1952, p. 128-130; Apr. 1952, p. 175-179. (F22)

128-F. The New Blooming Mill at Donawitz, Its Equipment and Operation. (In German.) Alois Vacek. *Stahl und Eisen,* v. 72, Mar. 13, 1952, p. 291-296.

Diagrams and illustrations. (F23, ST)

129-F. Automatic Extrusion Plant for the Aston Chain and Hook Company. *Engineering,* v. 173, Mar. 21, 1952, p. 374-376; Mar. 28, 1952, p. 392-394. **An Extrusion Plant.** *Engineer,* v. 193, Mar. 28, 1952, p. 444-447.

A 2000-ton horizontal extrusion press used by above British firm for production of brass and Cu sections, particularly commutator sections, for the electrical industry. They also produce a number of brass and Cu tubes and special hollow sections. (F24, Cu)

130-F. Latest Developments in Extrusion of Metals. Erwin Loewy. *Iron and Steel Engineer,* v. 29, Apr. 1952, p. 65-69; disc., p. 69-70.

Many of the problems faced in this field. Confined to hot extrusion. Chiefly considers high-temperature alloys. (F24, SG-h)

131-F. Pressure Distribution Between Stock and Rolls in Hot and Cold Flat Rolling. C. L. Smith, F. H. Scott, and W. Sylwestrowicz. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 347-359.

Method using a photo-elastic dynamometer; also, devices for measuring back tension and total force separating the rolls. Results given for cold rolling of annealed Cu strip, 2 mm. thick by 40 mm. wide, for reductions from 5-50%, and for similar hot rolled Cu strips with reductions of 18, 26, and 36%. Comparisons made with results calculated by Orowan's method. Apparatus diagrams and graphs. 13 ref. (F23, Cu)

132-F. The Hot Forging of Metals. H. K. Barton. *Machinery* (London), v. 80, Apr. 17, 1952, p. 679-683.

Methods and processes. Numerous diagrams. (F22)

133-F. New Forge and Heat-Treatment Plant for Die-Block Manufacture. L. H. Williams. *Metal Treatment and Drop Forging,* v. 19, Apr. 1952, p. 155-165.

Plant of Walter Somers Ltd., Halesowen, North Birmingham, England. Generally uses Ni-Cr-Mo and high-tensile plain carbon steel. (F22, J general, TS, CN)

134-F. Rotary Furnaces Feed Automatic Steel Treating Line. A. Q. Smith. *Iron Age,* v. 169, May 8, 1952, p. 122-124.

Two jet combustion, gas-fired forging furnaces and a modern conveyer system installed in the East Chicago plant of General American Transportation Corp., and used for heating and handling billets for 90, 105 and 120-mm projectiles. These billets are hot-extruded and drawformed. (F21, F24, G4)

135-F. Sheath Working of Zirconium Ingots. E. T. Hayes, G. L. Frederic, and E. D. Dilling. *Metal Progress,* v. 61, May 1952, p. 83-86.

Procedure consists of sheathing the Zr ingots in heavy-wall seamless mechanical tubing, and welding end plugs to the sheath to form a complete seal. After forging and rolling, the Fe sheath is stripped and the Zr metal worked to finished size. (F22, F23, Zr)

136-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 315-324.

(To be continued.) (F23, ST)

137-F. Modern Extrusion Plant. *Metallurgia,* v. 45, Apr. 1952, p. 173-177. Mechanized Extrusion Press. **Welding and Metal Fabrication,** v. 20, May 1952, p. 174, 188.

New plant of the Aston Chain and Hook Co., Ltd., Erdington, Birmingham, England. This installation includes a 2000/200-ton Fielding horizontal extrusion press together with the necessary billet handling and heating equipment. (F24)

138-F. Rolling of Angles. (In French.) M. J. Courtheoux. *Circulaire d'Informations Techniques,* v. 9, Apr. 1952, p. 534-542.

Compares American and British rolling methods with European methods. Diagrams and tables. (F23)

139-F. Friction, Wear, and Lubrication in Wiredrawing. (In German.) Werner Papsdorf. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 393-399.

Short historical survey of the application of lubricants. The latest theories and experiments on friction and wear. Graphs, tables, and diagrams. 17 ref. (F28, Q9)

140-F. Lubricants and Coatings for Drawing of Steel Wire. Part I. (In German.) Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 399-412; disc., p. 412-416.

Reviews theory of wiredrawing lubrication. Materials tested, test procedures, and their interpretation, influence of different coatings and lubricants on coefficient of friction and mean pressure in drawing of steel wire. Graphs, tables, and micrographs. 26 ref. (F28, ST)

141-F. Design and Mode of Operation of a Cluster-Type Reversing Cold-Rolling Mill With a Fluid Drive. (In German.) Martin Reimann. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 416-421; disc., p. 421-423.

High-speed reversing cold rolling

mills having very thin working rolls for production of cold-rolled steel strip of very small gage. Continuously variable mill drive by means of fluid-drive gears with 120 atm. of working pressure. Design and operation of the fluid-drive gear. Oil-hydraulic regulators for controlling the roll drive, reels, and tension strip. Operational results. Schematic diagrams. (F23).

142-F. (Book) **Forging and Forming Metals.** S. E. Rusinoff. 279 pages. American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. $3.95.

Impact forging, press forging, upset forging, extrusion, heat treatment of forgings, cleaning and finishing of forgings, inspection, safety, metal quality, and design of forged parts, as well as tools and dies. Entire sequence of some forging operations is illustrated — from the first operation on metal stock to the finished forgings. Standard practices and tolerances for impression die forgings; a glossary of forging terms, and an appendix of tables. (F22)

G

SECONDARY MECHANICAL WORKING

210-G. Stretch-Forming. Part II. Tooling Methods and Examples of Forming Procedure on the Sheridan Longitudinal Machine. Richard Wood. *Aircraft Production,* v. 14, Apr. 1952, p. 116-123.

Forming dies for use on the Sheridan stretch-forming machine can be made in a number of materials including wood, zinc alloy and concrete. (G9, Zn)

211-G. Die Design for Metal Drawing. Charles R. Cory. *Better Enameling,* v. 23, Apr. 1952, p. 22-23, 25-28, 33.

The forming of parts from flat sheets of metal. (G4, ST)

212-G. Diamond Grinding Wheels and Their Application. W. Peter. *Industrial Diamond Review,* v. 12, Mar. 1952, p. 47-48.

Diamond grinding wheels for machining hard materials. Characteristics are tabulated. Type of bond and bond material—steel alloy, special bronze, Cu, special cast iron and synthetic resin. (G18, AY, Cu, CI)

213-G. Hydroforming Proves Economical in Small Shop. Rhodes Danehower. *Iron Age,* v. 169, Apr. 10, 1952, p. 124-125.

Process and advantages of hydroforming. Alloys successfully drawn by Alloy Products include Inconel, L-605, Al, stainless steel, stainless-clad Cu, brass, and aluminized steel. (G8, Al, SS, Cu, ST, Ni)

214-G. How to Machine Titanium. D. C. Goldberg and W. S. Hazelton. *Iron Age,* v. 169, Apr. 17, 1952, p. 107-110.

Data is from joint Navy-Westinghouse research, and covers turning, broaching, drilling, tapping, reaming, and milling. Use of carbon dioxide gas as coolant wherever possible is recommended. Based on actual production experience. (G17, Ti)

215-G. Three Dies Form Stainless Steel Pitchers—All in One Stroke of the Press. Paul Prikos. *Machine and Tool Blue Book,* v. 48, Apr. 1952, p. 153-160.

Described, diagrammed, and illustrated. (G4, SS)

216-G. The Use of Carbides in Trepanning. Fred W. Lucht. *Machine and Tool Blue Book,* v. 48, Apr. 1952, p. 166, 168-171, 173-174.

See abstract of "Carbide Trepanning Accurate Bores in Record Time", *Steel;* item 198-G, 1952. (G17, C-n)

217-G. Automatic Tank Transmissions Demand Close Tolerances. Donald F. Taylor. *Machinery* (American), v. 58, Apr. 1952, p. 141-148.

Machining and flame hardening equipment and procedures at Buick Motor Div., General Motors Corp., Flint, Mich. Materials are Al alloys and alloy steels. (G17, J2, Al, AY)

218-G. Set-Ups That Expedite Camera Production. Herbert Chase. *Machinery* (American), v. 58, Apr. 1952, p. 180-185.

Presswork operations and projection welding of Al strip in production of Eastman cameras. (G1, K3, Al)

219-G. Russian Practice in Machining With Cemented Carbides. N. H. Polakowski. *Machinery* (London), v. 80, Mar. 27, 1952, p. 540-543.

Recent developments in carbide tool design and the performances said to be obtained in the U.S.S.R. Limited to single-point machining. Deals with cast iron, 50-ton, hardened, and heat resisting austenitic steel. Tables and diagrams. (G17, CI, ST)

220-G. Squirt Outdoes Flood in Cooling Cutting Tools. *SAE Journal,* v. 60, Apr. 1952, p. 45-48. (Based on "Hi-Jet System for Increasing Tool Life," by R. J. S. Pigott and A. T. Colwell, to be published in full in SAE Quarterly Transactions.)

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel;* item 72-G, 1952. (G21)

221-G. New Horizons for Aero Machining. Malcolm F. Judkins. *SAE Journal,* v. 60, Apr. 1952, p. 49-52.

Reviews proceedings of Los Angeles forum. New techniques and equipment for different shapes and materials. (G17)

222-G. 25 Years in the Sheet-Metal-Working Industry; a Survey. J. W. Langton. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 293-300.

Changes and developments which have taken place in the sheet-metal-working industry. (G general)

223-G. The Neutral Line and Its Application to Bend Allowances. A. Dickason. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 327-331, 333.

Includes diagrams and formulas. (G6)

224-G. Forming Stainless on Regular Shop Equipment. E. M. Rains. *Sheet Metal Worker,* v. 43, Apr. 1952, p. 44-45.

(G general, SS)

225-G. Press Forming Sheet Metals. Part I and II. Lester F. Spencer. *Sheet Metal Worker,* v. 43, Mar. 1952, p. 46-47, 86; Apr. 1952, p. 46, 48-50.

Part I: Operations such as blanking, punching, perforating, trimming, etc., in semi-production, sheet-metal shops; related factors that affect these operations. Operations involving a shearing action. Part II: Methods involving bending in the forming of shapes, which are confined to several specific designs of equipment. Factors influencing press-brake forming. (G1)

226-G. How to Hot-Form a Dimple. Thomas A. Dickinson. *Steel Processing,* v. 38, Apr. 1952, p. 172-174.

Method which avoids cracking in rivet hole forming of Al, Mg, Ti, and some alloy steels. (G2, Al, Mg, Ti, AY)

227-G. Oxygen-Flux Surface Cutting of High-Chromium Steels. (In Russian.) S. G. Guzov and O. Sh. Spektor. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 19-22.

The removal of surface defects from ingots and billets by oxygen cutting. Influence of torch design and other factors. Apparatus is diagrammed; results are charted and tabulated. (G22, SS)

228-G. Cutting With Ultra-High Purity Oxygen. E. H. Roper and J. F. Kiernan. *American Foundrymen's Society,* Preprint 52-57, 1952, 9 pages.

Experiments to determine effects of O_2 purities between 99.0 and 99.83% on cutting and starting of cuts on steel plate, billets, and cast steel sections. These studies show a straight-line relation between O_2 purity and cutting efficiency for the region explored. Starting times were independent of purity. Economic analysis indicates insufficient gains for commercial adoption. (G22, ST)

229-G. Titanium Tests Tools, Talent. *American Machinist,* v. 96, Apr. 28, 1952, p. 91-96.

Mechanical properties, formability, and riveted joints Ti, and Ti-alloy sheet. Stresses information that can be applied directly to shop operations. (G general, Q general, K13, Ti)

230-G. Plastics Equipment and Technique. Denis A. Dearle. *American Machinist,* v. 96, Apr. 28, 1952, p. 107-122.

A general survey of the equipment and tooling in the plastics field: presses, molds, molding techniques, product design, and finishing. An introduction to the mutual areas in which metalworking and plastics must work together: tools and equipment. (G general, T29)

231-G. Machining Data on High Temperature Alloys. P. G. DeHuff and D. C. Goldberg. *Automotive Industries,* v. 106, May 1, 1952, p. 46-49, 82, 86.

Analysis of some of the alloys used in jet engines. Parts application for these alloys. Shear strength, coefficient of friction and machining constant—plus the hardness, strain hardenability, and the amount of abrasive particles on the metal all affect the inherent machining qualities of the alloy. Summarizes the effect of these factors upon inherent machinability. (G17, Ti, SS, Ni)

232-G. Increasing Productivity in Production Machining. Michael Field and Norman Zlatin. *SAE Quarterly Transactions,* v. 6, Apr. 1952, p. 196-212.

The methods fall into two categories: reduction in time of performing the handling, clamping, rapid traversing, and other machine functions necessary to bring the workpiece to the cutting tool; and reduction in time necessary to machine the metal. Numerous graphs and photomicrographs of cast irons. (G17, CI)

233-G. Design and Manufacturing Techniques With Titanium. O. A. Wheelon. *SAE Quarterly Transactions,* v. 6, Apr. 1952, p. 373-384.

Determining the characteristics of the material and making designing and manufacturing practices compatible. Photographs. (G general, Ti)

234-G. Jet Alloys Toss Challenge to Machine Tools. P. G. DeHuff and D. C. Goldberg. *Steel,* v. 130 Apr. 28, 1952, p. 76-78.

Need for new tooling methods and machines for producing jet-engine parts. (G17, SG-h)

235-G. Magnesium Fabrication. Lower Finished Costs. *Steel,* v. 130, May 5, 1952, p. 98-101, 118, 121, 124.

Evaluates various fabricating techniques. (G general, Mg)

236-G. Die Design for Metal Drawing. Charles R. Cory. *Tool Engineer,* v. 28, May 1952, p. 48-51.

Considerations for binding; margin of safety between wrinkles and tears; inequality of developed draw lengths; drawing of deep depressions; use of shear steels; and drawing of a door inner panel. (G4)

237-G. Carbide Does the Job. Carbide Tools Also Make Profits in Civilian Work. James Blane. *Western Machinery and Steel World,* v. 43, Apr. 1952, p. 110-111.

Production of carbide tools at Tool Specialty Co., on the West Coast. (G17, T6, C-n)

238-G. Present Research on Improving the Economy of the Oxygen-Cutting Process. (In French.) M. Renaudie. *Revue de la Soudure; Lastijdschrift,* v. 8, Jan. 1952, p. 40-44.

See abstract from *Soudure et Techniques Connexes,* item 114-G, 1952. (G22)

239-G. Methods of Research on the Machinability of Metals. (Concluded.) (In French.) Léon Czaplicki. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts Appliqués a l'Industrie,* ser. 9, v. 95, Mar. 1952, p. 76-89.

Measurement of cutting forces, microhardness, cold hardenability. life of the tool, feed at constant temperature, cutting temperatures, and heat released during cutting. Includes schematic drawings, charts, and tables. 19 ref. (G17)

240-G. Continuous Fabrication of Light-Metal Automobile Bodies. (In German.) J. Baron. *Aluminium,* v. 28, Mar. 1952, p. 62-68.

Choice of alloys, sheet thickness, and deep drawing problems. (G4, Al)

241-G. The Oxygen Lance, and Its Application for Burning Holes Into Concrete, Minerals, and Steel. (In German.) R. Wolf and E. Zorn. *Schweisstechnik,* v. 6, Feb.-Mar. 1952, p. 13-18.

Economic and technical advantages of specialized applications. Data are tabulated and charted. (G22, ST)

242-G. Influence of Purity of Oxygen on the Process of Oxygen Surface Cutting. (In Russian.) A. K. Ninburg. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 13-16.

Investigated on low-carbon steel. It was found that O_2 of less than 95% purity is not satisfactory; for a given purity there is an optimum rate corresponding to the maximum productivity of the cutter and minimum use of O_2. Tables and graphs. (G22, CN)

243-G. Dynamics of Rapid Machining. (In Russian.) A. M. Rozenberg and Iu. P. Zimin. *Stanki i Instrument,* v. 22, Sept. 1951, p. 11-13.

Influence of cutting rate on cutting force during machining of steel. Tables and graphs. (G17, ST)

244-G. The Process of Forming Elementary and Compact Steel Chips. (In Russian.) M. I. Klushin. *Stanki i Instrument,* v. 22, Sept. 1951, p. 14-15.

Mechanism of chip formation during machining. (G17, ST)

245-G. Cutting Force During the Formation of Metallic Chips. (In Russian.) T. N. Lopadze. *Stanki i Instrument,* v. 22, Sept. 1951, p. 15-16.

Equations are developed to express cutting force. (G17)

246-G. Dependence of Cutting Rate and Stability on Feed Rate During Rapid Milling. (In Russian.) L. A. Rozhdestvenskii. *Stanki i Instrument,* v. 22, Sept. 1951, p. 17-18.

Experiments were conducted on several steels. Data are charted. A note by the editor takes exception to some of the author's statements. (G17, ST)

247-G. The Significance of Circumferential Forces During Face Milling Using Hard-Alloy Cutters. (In Russian.) A. I. Kashirin and V. Ia. Rassokhim. *Stanki i Instrument,* v. 22, Oct. 1951, p. 6-8.

The dependence of circumferential forces on cutting speed, depth of cut, feed per tooth, and face angle was determined. Data are tabulated and charted. (G17)

248-G. Grinding Carburized and Nitrided Steels With "Monocorundum" Wheels. (In Russian.) M. S. Rakhmarova. *Stanki i Instrument,* v. 22, Oct. 1951, p. 14-16.

A new abrasive material "monocorundum" was shown to be superior for grinding carburized and nitrided steel articles. Characteristics of a variety of abrasive wheels are charted. (G18, ST)

249-G. Properties of High-Speed Steel (E1347). (In Russian.) E. I. Malinkina, S. I. Volkov, Z. N. Arkhangel'skaia, and A. A. Badaeva. *Stanki i Instrument,* v. 22, Oct. 1951, p. 17-18.

Cutting tools and end mills made from three types of high speed steel were compared. Advantages and disadvantages of steel EI347 are given particular attention because of its low W and V contents. Data are tabulated and charted. (G17, T6, TS)

250-G. Influence of Specific Gravity of Hard Alloys on the Cutting Qualities of Tools. (In Russian.) M. N. Nikolaichik. *Stanki i Instrument,* v. 22, Oct. 1951, p. 20-21.

Experiments on cemented-carbide tools. Increased specific gravity accompanied decreased wear resistance. Graphs. (G17, Q9, C-n)

251-G. Glass Forming-Tools. J. Rees and P. K. Digby. *Aircraft Production,* v. 14, May 1952, p. 148-150.

Small-batch production of tools for making components from light-alloy sheet. Tool types covered are heating blocks, rubber-die press tools, and drop-hammer tools. Limitations and advantages. (G1)

252-G. Oil Jet Hits Spot, Stretches Tool Life. *Aviation Week,* v. 56, May 19, 1952, p. 39-40, 42, 45.

Hi-Jet process developed by Gulf Research & Development Co. (G21)

253-G. Flame-Cutting Reduces Cost of Jolt-Free Bridge Expansion Joints. *Engineering News-Record,* v. 148, May 8, 1952, p. 67.

Flame-cutting procedure at By-Products Steel Co., a division of Lukens Steel Co., Coatesville, Pa. (G23, CN)

254-G. Exhaust Ventilation For Machining Metals of High Toxicity. H. F. Schulte, E. C. Hyatt, and F. S. Smith, Jr. *Heating, Piping & Air Conditioning,* v. 24, May 1952, p. 86-89.

See abstract of "Exhaust Ventilation for Machine Tools Used on Materials of High Toxicity", *A.M.A. Archives of Industrial Hygiene and Occupational Medicine;* item 91-G, 1952. (G17, A7, U, Th, Be, Tl, Pb)

255-G. Better Design Permits Cheaper Stampings. Frederico Strasser. *Iron Age,* v. 169, May 8, 1952, p. 113-115.

Design tricks that can cut stock waste, die cost, and scrap rate. (G3)

256-G. Shape Flash to Speed Production—Cores Simplify Machining of Flash Welded Parts. J. Conlogue. *Iron Age,* v. 169, May 8, 1952, p. 126-127.

Method of removing weld spatter from inside welded track roller. Two specially shaped cores are inserted before flash welding. These shape the contour of the weld spatter, collecting some and making the balance easily broken and pushed out by a small hydraulic press. (G17, K3)

257-G. "Adaptineering" Speeds Fabrication of Light Metals. Roy Fellom, Jr. *Light Metal Age,* v. 10, Apr. 1952, p. 8-9.

Several methods used at Moss Engineering Co., Elkridge, Md., to get around problems caused by machine tool shortages. Special die block arrangement; circle cutting; sawing flanges and drawn forms. The company is producing precision Al and Mg sheet products. (G general, Al, Mg)

258-G. How Oils Should Be Used in Metal-Cutting and Grinding. Lee Ballard. *Machinery* (American), v. 58, May 1952, p. 182-184.

Types of cutting fluids in common use and factors influencing their selection, oils suitable for use in machining steels and Cu alloys, selection of oils for use on Al and Mg, application of heavy-duty soluble oils, and prevention of skin infection resulting from the use of cutting fluids. (G21)

259-G. Finishing Cast Iron Skillets. Walter Rudolph. *Metal Finishing,* v. 50, May 1952, p. 60-61.

Mechanical finishing and protective coating at Griswold Mfg. Co., Erie, Pa. (L general, CI)

260-G. Impact Extrusion of Magnesium. T. L. Patton. *Metal Industry,* v. 80, Apr. 25, 1952, p. 323-325.

See abstract from *Machine Design;* item 175-G, 1952. (G5, Mg)

261-G. Cold Extrusion of Steel Shell at Heintz Mfg. Co. *Metal Progress,* v. 61, May 1952, p. 72-74.

Process at the plant in Philadelphia. Low-carbon steel is used with punches and dies of high-carbon steel or toolsteel. (G5, CN, TS)

262-G. High-Speed Toolsteels. *Metal Progress,* v. 61, May 1952, p. 146, 148, 150, 152. (Condensed from "Tungsten and Molybdenum as High-Speed Steel Tool Materials. Part 2. Molybdenum, Tungsten-Molybdenum and Cast Chromium Tungsten High Speed Steels. K. J. B. Wolfe.)

Previously abstracted from *Alloy Metals Review.* See item 372-G, 1951. (G17, J general, T6, TS)

263-G. "Orange-Peeling" of Aluminum. *Metal Progress,* v. 61, May 1952, p. 184, 186. (Condensed from "Overcoming Orange Peeling on Stretch-Pressed Aluminum Alloy Aircraft Skinning", G. W. Weeks.)

Previously abstracted from *Metallurgia.* See item 77-G, 1952. (G9, J23, Al)

264-G. High Temperature Alloys Challenge Accepted Machining Methods. P. G. DeHuff and D. C. Goldberg. *Modern Machine Shop,* v. 24, May 1952, p. 98-104, 106, 108, 110, 112, 114.

See abstract of "Machining Data on High Temperature Alloys", *Automotive Industries,* item 231-G, 1952. (G17, Ti, SS, Ni)

265-G. Machining Magnesium. Frank Charity. *Modern Machine Shop,* v. 24, Apr. 1952, p. 114-116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144; May 1952, p. 138, 140, 142.

A summary covering unique properties of Mg together with recommended methods of machining it and its alloys. Fire hazards and preventive measures. Polishing methods. Tables. (G17, L10, Mg)

266-G. Unusual Presses and Dies. C. W. Hinman. *Modern Machine Shop,* v. 24, May 1952, p. 166, 168, 170, 172, 174, 176, 178, 180.

A press brake machine with tilt control to a thousandth of an inch. A tooling setup eliminating die time in broaching forged steel steering knuckles. A method for annealing only the neck of a tube or can. A pull-down press which handles extra-wide die sets on a comparatively

narrow bed. A drawing-die setup for shells with square corners and flat trimmed edges. (G1, J23)

267-G. Dynatomics Concept of Metal Removal. *Screw Machine Engineering,* v. 13, May 1952, p. 55-57.

See abstract of "New Metal Cutting Concept Lengthens Tool Life", *Steel;* item 87-G, 1952. (G17)

268-G. A Particular Problem in the Re-Design and Development of a Pressed-Metal Assembly. (Concluded.) J. A. Grainger. *Sheet Metal Industries,* v. 29, May 1952, p. 417-426.

Applied to an automatic air-filter assembly. (G1)

269-G. Basic Forming Techniques for the Copper Base Alloys. Part II. Lester F. Spencer. *Tool Engineer,* v. 28, May 1952, p. 62-65.

Causes of stress cracking and its prevention in various groups of forming operations. (To be continued.) (G general, Q25, Cu)

270-G. Fabricated Deep-Drawing Press. *Welding & Metal Fabrication,* v. 20, May 1952, p. 158-161.

A newly designed 1200-ton, triple-action, hydraulic, deep drawing press for work particularly on work-hardening-materials. It is made by Foster Yates & Thom, Ltd., Blackburn, England. Includes welding operations used in its construction. (G4, K general)

271-G. rPecision Flame-Machining of Gears and Sprockets. Glenway Maxon. *Welding Engineer,* v. 37, May 1952, p. 34-36.

Special flame-cutting machines developed for toothed wheels. Large gears having many teeth can be cut in short time. (G22, ST)

272-G. New Cutter-Tip Designs for Mechanization of Gas Cutting. (In Russian.) Ia. D. Rinskii and G. A. Bolkhovskoi. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 27-28. (G22)

273-G. Theoretical Analysis of the Process of Drawing Sheet Metal. (In Russian.) I. A. Noritsyn. *Izvestia Akademii Nauk SSSR,* Section of Technical Sciences, Nov. 1951, p. 1696-1703.

An analysis is made of the stress states in the various stages of drawing processes. Formulas for optimum operating parameters are proposed based on ultimate strength, resistance to deformation, radius of curvature, and thickness of metal. Schematic diagrams. (G4)

274-G. (Book) Production Processes; Their Influence on Design. Vol. II. Roger W. Bolz. 357 pages. Penton Publishing Co., Cleveland 13, Ohio. $7.50.

Groups a wide range of manufacturing methods under four headings: casting methods—sand, permanent-mold, centrifugal, investment, and others; molding methods—powder, plastics, rubber, ceramics; fabricating methods—welding, brazing; and treatment methods—heat treating, shot peening. Each chapter includes design detailing, material selection, and shop tolerances. (G general, E general, K general, H general, J general)

275-G. (Book) Metody Opredelenia Obrabatyvaemosti Metallov. (Methods of Determining the Workability of Metals.) E. I. Fel'dshtein. 143 pages. 1946. State Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R.

Reviews classical methods which entirely reproduce the corresponding type of machining, accelerated methods of investigation based on short-time tests, and the relation between mechanical properties of metals and their workability. Emphasis is on "face machining"; and experimental verification of applicability of this method is presented. 75 ref. (G17, Q23)

276-G. (Book) Skorostnoe Frezerovanie Stali. (High-Speed Machining of Steel.) P. P. Grudov, S. I. Volkov, and V. M. Vorob'ev. 259 pages. 1950. Central Bureau of Technical Information, Moscow, U.S.S.R.

The theory of cutting and its application to the design of lathes and milling machines. Production of cutting tools, and operation of different types of automatic and semi-automatic mill machines. Numerous tables, diagrams, and illustrations. 41 ref. (G17, ST)

H

POWDER METALLURGY

57-H. Five Ways to Make Iron Powder. B. T. duPont and Robert Fulton. *Iron Age,* v. 169, Apr. 24, 1952, p. 135-139.

Full-scale and pilot-plant production processes at Plastic Metals Div., National Radiator Co., Johnstown, Pa. In the electrolytic process, high-purity Fe powder is obtained from steel plates. A rotary kiln, saggers, and a continuous-belt furnace all turn out sponge iron of different types. Scrap is still another source of Fe powder being melted, atomized, pulverized, and decarburized. Tabular data on properties. (H10, Fe)

58-H. Novel Methods Used to Form Molybdenum. G. L. Miller. *Iron Age,* v. 169, Apr. 17, 1952, p. 122-124.

Methods used in the production of ceramic products, and techniques used in making hard metal dies from tungsten carbide-cobalt powder have recently been successfully adapted for use in fabricating Mo metal. (H general, Mo)

59-H. A Directory of the Powder Metallurgy Industry. *Precision Metal Molding,* v. 10, Apr. 1952, p. 53-55, 57-60, 62-64, 66, 68-69, 71-74, 76.

A listing of components fabricators, powder producers, and equipment builders. (H general, A10)

60-H. Precision in Metal Powder Parts Is Not Limited to Dimension. Erle I. Shobert, II. *Precision Metal Molding,* v. 10, Apr. 1952, p. 36-37, 114.

Suggests a broader conception of precision for powdered metal components. Some essential properties of materials in the molding operation, such as electrical, magnetic, and mechanical properties, must be considered in addition to sizes and tolerances, densities, time under pressure, and die design. (H11)

61-H. New-Type Powdered Metal Bearing With Built-In Oil Reservoir. *Precision Metal Molding,* v. 10, Apr. 1952, p. 35, 101.

Bearings are made with porous Fe core and high-density surface. For high speed applications a bronze bearing face is applied. (H general, T7, Fe, Cu)

62-H. High Density Iron Powder Parts. Philip R. Kalischer. *Precision Metal Molding,* v. 10, Apr. 1952, p. 32-34, 99-100.

Properties, method of manufacture, applications, and design of compacts. Photomicrographs. (H general, Fe)

63-H. Friction Properties of Powdered Bronze Give New Saw Safety Device. *Precision Metal Molding,* v. 10, Apr. 1952, p. 31.

A "kick-proof" clutch used in portable circular saws by the Porter-Cable Machine Co., Syracuse. (H11, Q9, T6, Cu)

64-H. Characteristics of Core Materials Produced by Powder Metallurgy. *Precision Metal Molding,* v. 10, Apr. 1952, p. 38, 40.

For high-frequency electronic applications. Covers carbonyl iron powders, especially, and ferrites. Tables and graphs. (H10, Fe)

65-H. The Plus and Minus of Making Your Own Metal Powder Parts. Joseph L. Bonanno. *Materials & Methods,* v. 35, Apr. 1952, p. 101-105. (H general)

66-H. Industrial Applications of Semi-Conductors. 2. Silicon Carbide Resistors. R. W. Sillars. *Research,* v. 5, Apr. 1952, p. 169-175.

Manufacture and uses of resistors and general properties of Si carbide. (H general, T1, Si, C-n)

67-H. Role of Gases in the Production of High Density Powder Compacts. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 540.

Discussion of paper by Donald Warren and J. F. Libsch. See item 83-H, 1951. (H11, H14, H15, Fe, Co)

68-H. Powder Metallurgy of Zirconium. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 510-511.

Discussion of paper by Henry H. Housner, Herbert S. Kalish, and Roswell P. Angier; item 66-H, 1951. (H14, H15, Zr)

69-H. Sintered Aluminium of High-Temperature Strength. (In German.) R. Irmann. *Aluminium,* v. 27, Oct. 1952, p. 29-36.

See abstract from *Revue de l'Aluminium,* July-Aug., 1951, Sept. 1951. (In French.) See item 2-H, 1952. (H general, Al)

70-H. Magnetic Observation of Diffusion During Sintering of a Nickel-Zinc Alloy. (In German.) Werner Köster and Josef Raffelsieper. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 37-39.

Method consisting of recording and analysis of magnetization curves. Results are indicated for some Ni-base alloys containing Zn. (H15, N1, Zn)

71-H. Determination of Particle Size in the Submicron Range. Y. Schubert and B. Kopelman. *Powder Metallurgy Bulletin,* v. 6, Apr. 1952, p. 105-109.

Brief discussion, with a table on methods available, classified according to size. Specifically deals with measurement of ultra-fine Fe powder by B.E.T. and X-ray line-broadening methods. (H11, Fe)

72-H. Sintered Alloys For High-Temperature Service in Gas Turbines. R. W. A. Buswell, I. Jenkins, and W. R. Pitkin. *Powder Metallurgy Bulletin,* v. 6, Apr. 1952, p. 110-113. (Condensed from Iron and Steel Institute "Symposium on High Temperature Steels and Alloys For Gas Turbines".)

Previously abstracted from original; item 69-H, 1951. (H15, T25, Co, SG-h)

73-H. National Cash Register Pioneers in High Density Iron Powder Parts. Philip R. Kalischer. *Precision Metal Molding,* v. 10, May 1952, p. 38-42, 70-74, 76-77.

Some of the actual parts being made from iron powder at N.C.R., and the fabricating procedures used. Photomicrographs. (H general, Fe)

74-H. (Book) Aluminum Powders and Pastes: "The Tale of the Powdered Pig". 84 pages. 1951. Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky.

Development of Al powders; modern production methods; applications to paints and coatings, to pyrotechnics; to heat reactions, to chem-

ical processing, to powder metallurgy, to surgery and silicosis, miscellaneous uses; characteristics; testing and evaluation; and handling and storage.
(H general, L26, T general, Al)

J

HEAT TREATMENT

123-J. Flame-Hardening; Use of Oxygen With Town's Gas in New German Process; Automatic Control of Heating and Quenching Cycle. *Aircraft Production,* v. 14, Apr. 1952, p. 144-146. (J2)

124-J. This Furnace Processes These Parts. *American Machinist,* v. 96, Apr. 14, 1952, p. 139.

Versatility in heat treating method and work-size accommodation is required by Rockford Clutch Div., Borg-Warner Corp. By installing an Ipsen Industries automatic-cycle, controlled-atmosphere furnace, metal stampings and machined parts are carbonitrited up to 2½ times faster than the former method of liquid cyaniding. (J28, ST)

125-J. Gas—Key to Industrial Production and Metal Conservation. Charles C. Eeles. *Industrial Gas,* v. 30, Apr. 1952, p. 3-5, 25-36.

How precision gas heat treatment brings savings in steel tonnage; atmospheric furnaces add to savings; and modern forge heating minimizes waste.
(J general, F21, ST)

126-J. Continuous Heat Treating System for Cast Armor Plate Being Installed. *Industrial Heating,* v. 19, Apr. 1952, p. 638, 650.

Automatic system in the new heat treating plant of General Steel Castings Corp., Eddystone, Pa. Continuous operation will be accomplished by using motor-driven flat-deck cars to transport the parts through a battery of heat treating furnaces. (J general, CI)

127-J. Water Sprays: How Effective Can They Be? W. P. Wallace and T. L. Newton. *Iron Age,* v. 169, Apr. 10, 1952, p. 121-123.

Effects of pressure, nozzle size, quantity of flow and droplet size on the cooling rates of water sprays. Specimens of 70-30 brass, heated to 1000° F. in an electric furnace, were quenched. Pressures in the circulating closed system varied from 0 to 100 psi. at an output of 90 gpm. Cooling curves were automatically recorded. (J2, Cu)

128-J. Continuous Carbon Restoration Furnace Boosts Production. J. D. Armour. *Iron Age,* v. 169, Apr. 17, 1952, p. 111-115.

New six-zone, continuous carbon restoring-annealing furnace at Union Drawn Wire Div. has increased production over batch methods 112-240% per invested dollar. Greater uniformity of surface carbon and shorter cycles have also been obtained and "scalloped" bars have been eliminated. The furnace handles bars up to 6 in. diam. and coils up to 54 in. diam. Atmosphere is controllable. (J23, ST)

129-J. Unique Line Hardens and Chills 16-Ft. Pieces. H. W. Dammel. *Iron Age,* v. 169, Apr. 17, 1952, p. 120-121.

New flame hardening machine and a special chilling unit which treats machine tool wear strips. This heat treating line has recently been completed at the Cincinnati Steel Treating Co. (J2, ST)

130-J. New Automatic Shaker Hearth Furnace for Fast Production of Small Parts—Cases From .001 to .003 Obtainable in From 1 to 5 Minutes. William F. Schleicher. *Machine and Tool Blue Book,* v. 48, Apr. 1952, p. 201-204, 206.

Equipment for hardening small steel tabs used in business machines with low distortion tolerances. (J28, ST)

131-J. How to Harden Small Steel Parts. Kenneth Rose. *Materials & Methods,* v. 35, Apr. 1952, p. 112-115.

Useful tips on ways to avoid precooling, prevent decarburization, and methods of conveying the work through the furnace. (J26, ST)

132-J. Temperature Controlled Flame Hardening. *Metallurgia,* v. 45, Mar. 1952, p. 135-137.

The Peddinghaus oxy-town-gas system for surface hardening of steel. (J2, CN)

133-J. The Function of Energizers in Pack Carburizing. Axel Hultgren. *Metallurgia,* v. 45, Mar. 1952, p. 149. (Translated and condensed from *Jernkontorets Annaler,* v. 135, No. 11, 1951, p. 575-604.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 202-J. 1951. (J28)

134-J. Electric Box-Type Furnace Increases Efficiency of Heat Treating Dental Forgings. *Modern Machine Shop,* v. 24, Apr. 1952, p. 250, 252, 254.

Brief account of furnace used at the S. S. White Dental Mfg. Co., Philadelphia. (J21, CN, SS)

135-J. Flame-Hardening of Locomotive Tyres. *Railway Gazette,* v. 96, Apr. 4, 1952, p. 376-377.

A semi-automatic plant for flame-hardening locomotive wheel flanges, a feature of which is the use of oxygen—town gas as the heating medium. A comparison between tire wear on normal and flame hardened tires is shown in diagrams. (J2, Q9)

136-J. Bright Annealing of Nickel and Its Alloys. H. J. Hartley and E. J. Bradbury. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 337-341, 343.

See abstract from *Journal of the Institute of Metals;* item 80-J, 1952. (J23, Ni)

137-J. Flame Hardening With Oxy-Town Gas; Demonstration of Peddinghaus Equipment. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 342-343. (J2, ST)

138-J. Some Notes on the Surface Hardening of Steels and the Use of Copper Plating for Stopping-Off. G. K. Burton. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 367-368, 370. (J28, L17, ST, Cu)

139-J. Annealing Accelerated With Radiant Heat. Charles A. Turner Jr. *Steel,* v. 130, Apr. 14, 1952, p. 106, 108, 111.

A continuous annealing method whereby tin-plate strip can be run at the rate of 1000 ft. per min. in direct-fired radiant gas heating equipment. Annealing can be a 90-sec. process. (J23, CN)

140-J. Pipe Weld Normalizing and Stress Relieving. C. A. Anderson, D. H. Corey and H. J. Denman. *Welding Journal,* v. 31, Apr. 1952, p. 324-329.

An improvement in the application of the 60-cycle induction heating method for normalizing and stress-relieving welded pipe joints; the metallurgical effects should not be changed by the electrical circuit changes described. Design computations and some of the lessons learned in the field. (J24, J1, Cu)

141-J. Production Non-Ferrous Wire Annealing at Bridgeport Brass. W. J. Krailing. *Wire and Wire Products,* v. 27, Apr. 1952, p. 370-371, 421.

A new idea in materials handling methods as applied to heat treating processes. How a leading manufacturer made more efficient use of existing facilities. (J23, A5, EG-a)

142-J. A Modern Electric-Furnace Heat Treatment Installation for Automobile Tools. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, Jan.-Feb. 1952, p. 26-30.

Belgian factory performs, continuously and automatically, the following heat treatments: quenching or oil hardening of automobile tools and tempering of these tools. Photographs, micrographs, and tables. (J26, J29, ST)

143-J. Surface Hardening of Cast-Iron Guide Plates of Lathes. (In Russian.) G. R. Dobis. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 23-26.

Flame hardening of critical surfaces of lathe beds. Equipment. Micrographs. (J2, CI)

144-J. Malleable Iron Annealing Time Reduced. W. G. Wilson and N. F. Tisdale, Jr. *American Foundrymen's Society,* Preprint, 52-41, 1952, 6 pages.

Addition of approximately 0.0015% B made it possible to reduce the annealing cycle markedly. Micrographs. (J23, CI)

145-J. Heat Treatment of Magnesium Alloy Castings. E. M. Gingerich. *American Foundrymen's Society,* Preprint 52-51, 1952, 8 pages.

Important phases of commercial heat treatment of Mg-alloy castings. Micrographs, macrographs, and tables. 10 ref. (J general, Mg)

146-J. Application of the Isothermal Transformation Diagram to the Normalizing of En 40C Steel. J. A. Cameron. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 313-320.

In reference to large forgings, evaluates Scheil's hypothesis in the pearlite range and Pumphrey and Jones' method for the bainite transformation. Tables and micrographs. 11 ref. (J24, N8, AY)

147-J. Heat-Treatment of Grey Cast Iron; Report and Recommendations of Sub-Committee T.S. 31. T. R. Twigger, chairman. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A332-A339, disc., p. A339-A340.

Previously abstracted from *Institute of British Foundrymen;* item 210-J, 1951. (J general, CI)

148-J. Selection and Treatment of Die Steels. Part II. Stewart G. Fletcher. *Tool Engineer,* v. 28, May 1952, p. 52-54, 57.

Influence of heat treatment on die life; surface control in heat treatment; die design; and die-steel quality. (J general, T5, TS)

149-J. Rapid Tempering of High Speed Steel. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 517-518.

Discussion of paper by A. E. Powers and J. F. Libsch. Item 259-J, 1951. (J29, TS)

150-J. Strength Properties of Flame Hardened Link Pins. (In German.) H. W. Gronegre. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Mar. 11, 1952, p. 231-233.

Process was investigated as applied to steel pins or bolts. Graphs and tables show effects of variations in procedure on hardness, bend strength, impact strength, and durability. (J2, Q general, CN)

151-J. Advances in Induction Heating. John Parina, Jr. *Metal Progress,* v. 61, May 1952, p. 80-82.

Brief reports on the March 1952 meeting in Cleveland of the Amer-

ican Institute of Electrical Engineers for a conference on induction and dielectric heating. Covers 60-cycle heating for forging of nonferrous metals; induction heating for forging steel transmission gears; and selection of induction-heating equipment. (J2, F21)

152-J. Modern Designs of Malleablizing Furnaces. (In German.) K. Borchart. *Giesserei,* v. 39, Apr. 17, 1952, p. 171-179.

Batch-type furnaces. Chamber furnaces with horizontal charging by means of charging machine. Elevator-type furnaces with elevated furnace body and movable hearth carriage. Pusher-type malleablizing furnaces. Hood-type furnace with movable annealing hood and several bases. Diagrams and illustrations. (J23)

153-J. Bright Annealing of Steel Strip in Grunewald Type Furnace With Protective Gas, and Without Water Cooling. (In German.) Hans Pannek. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 423-425.

When using annealing ovens of Grunewald type, water cooling of the rubber seal has been necessary. This has certain drawbacks. Tests with seals more heat resistant than rubber, and with protective gas practically free of oxygen. A composite asbestos-rubber seal gave good results. Diagrams and tables. (J23, ST)

154-J. Determination of the Cooling Capacity of Quenching Baths. (In Italian.) Manlio Pesante. *Metallurgia Italiana,* v. 44, Apr. 1952, p. 145-152.

New electronic apparatus may be used to plot curves of cooling rate vs. temperature. Results of preliminary tests with different types of baths and media. (J26)

155-J. Study of the Carburization of SAE 3312 Steel in Molten Salts. (In Portuguese.) Alberto A. Arantes and Vicente Chiaverini. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 447-468; disc., p. 469-470.

Influence of temperature of carburization and of time of treatment on characteristics of the carburized layer. Tables and graphs. (J28, J2, AY)

156-J. (Book) **Elements of Hardenability.** M. A. Grossmann. 164 pages. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.50.

Hardenability tests, nature of hardening, nature of the quenching process, and effects of alloying elements on hardenability. (J26, ST)

K

JOINING

329-K. Peroxide Tanks Pose Welding Problems. W. F. Shefelton. *American Machinist,* v. 96, Apr. 14, 1952, p. 173.

Picture study of weld fabrication of large tank made of ⅜-in. high-purity Al, for storage of H_2O_2. Inside seams are Heliarc welded; outside seam are preheated with a gas-welding torch to 300° F. prior to welding; and head seams are sigma welded on the outside. Circumferential seams are sigma welded after inside has been Heliarc welded with high-purity rod. (K1, K2, Al)

330-K. Construction of the Willys-Overland Body and Frame. Joseph Geschelin. *Atuomotive Industries,* v. 106, Apr. 15, 1952, p. 46-47, 87.

Welding processes using overhead-mounted portable spot welders, arc welding at certain points in ventilated booths, and use of suitable spot sealers. (K3, K1, T21)

331-K. Huge Spot Welders for Joining Heavy Gage Metals at Ryan and Republic Plants. *Automotive Industries,* v. 106, Apr. 15, 1952, p. 48-49. (K3)

332-K. Reducing Locomotive Maintenance and Repair Costs by Reclaiming Parts with "Heliarc" Welding. C. R. Strutz. *Diesel Power,* v. 30, Apr. 1952, p. 64-66.

Welding assumes greater importance in the railroad field with the introduction of inert-gas-shielded-arc welding. The process and how it is now possible to make better and faster welds with ferrous as well as the more common nonferrous metals. (K1, ST, Al)

333-K. Polyisocyanates in Bonding Rubber to Metals. T. J. Meyrick and J. T. Watts. *India-Rubber Journal,* v. 122, Mar. 29, 1952, p. 505-506.

A method for the use of a polyisocyanate together with a neoprene alloprene cement. Tabular data. (K11)

334-K. Unusual Soldering and Brazing Operations Performed in Heat Treating Furnaces. *Industrial Heating,* v. 19, Apr. 1952, p. 624, 626, 628.

As performed by Glass Solder Engineering Co., South Pasadena, Calif. (K7, K8)

335-K. Stud Welding Cuts Fabrication Time. *Iron Age,* v. 169, Apr. 24, 1952, p. 146-147.

Portable guns are used for end-welded studs in the fabrication of railroad cars; also attaching furring strips, insulation, wood liners, and ladders. (K1, CN)

336-K. Brazing the Modern Way. Lester F. Spencer. *Machinery* (American), v. 58, Apr. 1952, p. 167-169.

Recommended procedures and equipment. Compositions of commercial brazing alloys are tabulated. The alloys and fluxes for various metals. (K8, T5, SG-f)

337-K. Unique Welding Fixture Results in Large Savings. *Machinery* (American), v. 58, Apr. 1952, p. 178-179.

For arc welding of steel conveyor flights. (K1, CN)

338-K. Recommended Conditions for Spot-Welding Annealed Inconel Sheet. *Machinery* (American), v. 58, Apr. 1952, p. 243.

A data sheet. (K3, Ni)

339-K. Materials and Procedures for Soldering Aluminum. G. W. Birdsall. *Materials & Methods,* v. 35, Apr. 1952, p. 116-118.

Successful soldering of relatively small assemblies is now commercially feasible provided proper solders, fluxes, and techniques are used. (K7, Al)

340-K. Automatic Welding With Contact Electrodes. W. P. van den Blink, H. Bienfait, and J. A. van Bergen. *Philips Technical Review,* v. 13, Mar. 1952, p. 247-253.

Mechanization of welding has now become possible through the development of certain types of electrodes together with an automatic welder. (K1)

341-K. Design Data For Metal Wire Stitching. *Product Engineering,* v. 23, Apr. 1952, p. 156-157.

Data sheet includes tables and diagrams for various metals and nonmetals. (K13)

342-K. Counters Tunnel Problem With Long Rails, Rubber Pads. *Railway Engineering and Maintenance,* v. 48, Apr. 1952, p. 394-395.

New butt-welded rails with rubber-pads placed above and below the tieplates were tied in two tunnels in an effort to lick the problem of corrosion and excessive mechanical wear of ties. (K1, R general, Q9, CN)

343-K. Spot Welding of Light Alloys Made Easier by New Equipment. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 358.

"Modu-Wave" spot welding machine for Al and light alloys. (K3, Al)

344-K. Shielded, Submerged Arc Welds Withstand Rugged Service. F. R. Drahos. *Steel,* v. 130, Apr. 14, 1952, p. 94-96.

Some examples of applying weldments to high-tensile, heat resistant, and corrosion resistant alloys, whether in a cast, forged, or wrought condition. Concerns massive components for large centrifugal pumps. (K1, L24, SG-g, h)

345-K. Outstanding Welding Repairs on Hot Blooming Mill Shears. E. E. N. Bernhard and P. A. Dixon. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 2-7.

Repair of a large steel casting by welding. Technique used is claimed to be entirely new. Severe load conditions met. Each stage of repair is illustrated with photographs and drawings. (K general, T5, CI)

346-K. A Welded Pipe Valve in Nigeria. G. Fairservice. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 8-9.

An emergency valve was quickly designed and fabricated with the aid of welding from ¼-in. mild steel plate, stiffened on the inside with ¼-in. plate brackets. Construction and fitting of the valve. (K1, T4, CN)

347-K. Welding in the Fire Engineering Industry. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 10-12.

Welding and fabrication of turntable ladders of all-steel construction, made in four or five sections. (K general, T10, ST)

348-K. A Special All-Welded 120-Ton Trailer. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 13-15.

The trailer is of all-welded design, and it is an example of the strength of this form of fabrication. (K general, T21, ST)

349-K. An All-Welded Goliath-Type Crane. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 15.

Fabricated with Murex "Fastex 5" electrodes. (K1, ST)

350-K. Welded Motor Lighters. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 17-20.

(K general, T22, ST)

351-K. A Welded Stainless Steel Tanker. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 20-21.

Tank was built by Andrews Bros. Ltd., specialists in the fabrication of stainless steel. (K general, T22, SS)

352-K. Fabricating Modern Pressure Vessels. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 120-129.

The plant and layout of G. A. Harvey & Co., London. Recent developments in the manufacture and design of pressure vessels. (K general, T26, CN)

353-K. Failures in Welded Ships. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 130-134. (K9, CN)

354-K. Quality Control of Spot Welded Assemblies. A. J. Hipperson. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 99-102; Apr. 1952, p. 143-145.

Methods employed for maintaining consistent spot welds. Tabular data on welding carbon and stainless sheet. (K3, CN, SS)

355-K. Practical Aspects of Welding and Metalworking. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 151-152.

Fixing methods for small piercing punches; pipe butt welds and repair of hydro-extractors. (K general)

356-K. Weldable Low-Alloy Steels for Pressure Vessels. (Translated and Condensed from "Schweissbare niedriglegierte Stähle mit hoher Warmstreckgrenze für Hochdruck-Kesseltrommeln," *Stahl und Eisen*, v. 71, 1951, p. 1443-1444.) Franz Nehl. *Welding Journal*, v. 31, Apr. 1952, p. 231s-232s.

(K general, T26, AY)

357-K. Heat Treating Properties of Low Hydrogen Electrode Weld Metals. D. C. Smith and W. G. Rinehart. *Welding Journal*, v. 31, Apr. 1952, p. 296-305.

Necessity for matching the mechanical properties of roller or cast steel with the weld metal which requires an adjustment of the alloy composition of the electrode and the type of electrode coating. Graphs, tabulations, diagrams. (K1, T5, AY)

358-K. Preheating for Welding. Arthur B. Tesmen. *Welding Journal*, v. 31, Apr. 1952, p. 306-313.

A review of information and experience to produce crack-free welded joints under a wide variety of conditions. Includes table of preheat temperatures for metals and alloys. 14 ref. (K general)

359-K. Should Welding Be on Its Own in Education? Discussion. Donald S. Clark. *Welding Journal*, v. 31, Apr. 1952, p. 313-314.

Discussion of paper published in July 1951 issue. (K general, A3)

360-K. Recommended Practice for the Welding of Steel Castings. (A Condensation.) *Welding Journal*, v. 31, Apr. 1952, p. 315-321.

Excerpt from a study carried out as part of the continuing research and development program of Steel Founders' Society of America. Includes specifications; effects of welding and combating these; operations, and post-weld heat treatment. (K general, CI)

361-K. Resistance Variations During Spot Welding. Discussion. H. Udin. *Welding Journal*, v. 31, Apr. 1952, p. 322-323.

Discussion of paper by W. L. Roberts in Nov. 1951 issue (item 19-K, 1952). (K3)

362-K. Kilowatts Don't Weigh Anything. W. P. Brotherton. *Welding Journal*, v. 31, Apr. 1952, p. 334-336.

Only recently has spot welding attained top billing in the aircraft industry. Modern equipment is now engineered to fabricate primary, load-carrying aircraft structures and heavy-gage metals of practically every kind. At Ryan they are securing spot welded joints in stainless steels that are 100% efficient compared with an average of 60% efficiency for riveted joints. (K3, SS)

363-K. Refinery Welding. C. G. Herbruck. *Welding Journal*, v. 31, Apr. 1952, p. 337-339.

Work at C. F. Braun & Co. plants. (K general, T29)

364-K. Welding Sequence Prevents Distortion. F. C. Geibig. *Welding Journal*, v. 31, Apr. 1952, p. 339.

How three spokes of a cast-iron sheave, which cracked under heavy loading, were repaired by braze welding. A definite welding sequence was followed to avoid distortion. (K8, CI)

365-K. A. C. Argonarc Process for Welding Aluminium: an Oscillographic Analysis of Effects of Welding Transformer Open-Circuit Voltage or Arc Re-Ignition. L. H. Orton and J. C. Needham. *Welding Research*, v. 5, Dec. 1951, p. 252r-274r.

Tests were made on two work plate materials over a range of open-circuit voltage, at approximately constant current, both with and without high-frequency spark injection, on a circuit deriving power from a leaky-reactance type welding transformer, and both with and without a large series capacitor in the welding circuit. Establishes for these tests the open-circuit voltages for the avoidance of rectification. Explains wide discrepancies in previous literature. Fundamental question of the nature of the arc re-ignition. (K1, Al)

366-K. Spot Welding of Coated Mild Steel Sheet. A. J. Hipperson and P. M. Teanby. *Welding Research*, v. 5, Dec. 1951, p. 275r-278r.

Operational data to solve certain production difficulties in spot welding of electrodeposited Cd and Zn coatings. Electrode sticking and sensitivity of weld to small changes of machine settings. (K3, L17, CN, Cd, Zn)

367-K. Welding in Hydro-Mechanical Structures. (In French.) J. J. Woolf. *Soudure et Techniques Connexes*, v. 6, Jan.-Feb. 1952, p. 5-13; disc. 13-15.

Welding of equipment in heating plants, particularly water pipes, and reconditioning work such as electric-arc and oxy-acetylene torch reconditioning. (K general, CN)

368-K. Electric Arc Welding of Magnesium Alloys. (In Russian.) K. K. Khrenov, M. I. Garchenko, and G. P. Sakhatskii. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 1-5.

An investigation was made of carbon-arc welding of Mg alloy. Fluxes, weld design, and other variables were studied. Results tabulated. Micro and macrophotographs. 12 ref. (K1, Mg)

369-K. Welding of Rod Frameworks for Reinforced Concrete by the Method of N. G. Slavianova. (In Russian.) S. T. Nazarov and I. S. Dmitriev. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 6-9.

Variables were studied. Results are tabulated. Schematic diagrams. (K1, CN)

370-K. Instrument for Dilatometric Control of the Spot Welding Process. (In Russian.) D. S. Balkovets and A. P. Pomortsev. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 10-13.

Apparatus is described and diagrammed. Its use and typical tabulated data. (K3)

371-K. Calculation of Resistance During Spot Welding of Low-Carbon Steel. (In Russian.) L. V. Glebov. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 13-14.

Equations are developed and several variables discussed. Data are tabulated and charted. (K3, CN)

372-K. Electrical-Contact Resistance During Fusion Butt Welding. (In Russian.) P. S. Elistratov. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 14-16.

Experimental values are broken into component parts. Current density, rate of fusion, and type of welding machine (two types) were the principal variables. Data are tabulated and charted for low-carbon steel. (K1, CN)

373-K. Mechanism of Striking Electric Welding Arcs. (In Russian.) M. Ia. Broun and G. I. Pogodin-Alekseev. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 16-17.

A theoretical discussion. Several variables are included. (K1)

374-K. New Automatic Apparatus for Arc Welding Thin Sheets of Steel. (In Russian.) B. I. Kalinkin. *Avtogennoe Delo*, v. 22, Aug. 1951, p. 17-20.

A new machine is described and schematically illustrated. Applications. (K1, ST)

375-K. The Pre-Eminence of Soviet Science and Technology in Welding Under Flux. (In Russian.) *Avtogennoe Delo*, v. 22, Sept. 1951, p. 1-3.

Various examples of developments said to have been made in Russia ahead of America and other capitalistic countries. (K1)

376-K. Nitrogen-Arc Welding of Copper. (In Russian.) A. N. Shashkov and Ts. S. Khromova. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 4-7.

The use of nitrogen instead of argon as a protective medium. Results of the two methods are compared in photographs. Data are tabulated and charted. (K1, Cu)

377-K. Investigation of Parameters of the Gas Pressure Welding of Tubes. (In Russian.) A. S. Fal'kevich and R. B. Poliakova. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 7-11.

Butt welding of low-carbon steel tubing by the gas-pressure method. Use of automatic equipment. Data are tabulated and charted. (K2, CN)

378-K. The Problem of the Transfer of Phosphorus From the Flux Into the Weld Metal During Automatic Weldings. (In Russian.) M. R. Shraerman. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 11-14.

Investigated in the laboratory. The influence of P and Mn content on mechanical properties of welds in 1.40% Mn steel was determined. Data are tabulated and charted. (K1, Q general)

379-K. Conditions for Exceeding the Output Characteristic of a Welding Transformer Through a Given Point. (In Russian.) G. I. Leskov. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 14-15.

A mathematical discussion. Results are charted. (K1)

380-K. Welding High Pressure Tubes. (In Russian.) I. Z. Kagan. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 24-25.

Preparation and welding of thick-walled, carbon steel tubing. Diagrams. (K general, CN)

381-K. Definition of the Concept of the "Weldability of Metals". (In Russian.) A. A. Alov. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 26-29.

Various aspects are illustrated by photomicrographs of welds in steel. 10 ref. (K9)

382-K. Definition of the Concept of "Weldability". (In Russian.) *Avtogennoe Delo*, v. 22, Sept. 1951, p. 29-30. (K9)

383-K. The Problem of Definition of the Nature of the Concept of "Weldability of Metals". (In Russian.) A. I. Krasovskii. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 30-31.

Conclusions reached by a committee on "The Weldability of Metals" organized by "VNITOS". (K9)

384-K. Good Aluminum Welding Starts With the Engineer. R. M. Curran. *General Electric Review*, v. 55, May 1952, p. 13-15.

Discussion and tables of properties to aid in selection of Al alloys and proper welding process. (K general, Al)

385-K. Special Spot Welding Machines Solve Huge Aluminum Alloy Fuel Tank Production Problems. *Light Metal Age*, v. 10, Apr. 1952, p. 26-27.

Equipment and procedure at Ryan Aeronautical Co., San Diego. (K3, Al)

386-K. New Tugs For Old. *Marine Engineering and Shipping Review*, v. 57, May 1952, p. 72-74.

Electric arc welded prefabrication of hull and superstructure parts speeds modernization of tugboat fleet. (K1, CN)

387-K. Properties of Some Heat-Resistant Adhesives. C. W. Roush and A. J. Kearfott. *Mechanical Engineering*, v. 74, May 1952, p. 369-374.

Information collected while developing and improving an adhesive for brake-shoe application, which is one of the most severe in the automotive industry. The requirements imposed indicate the range of properties that can be expected. (K12)

388-K. Resistance Welding. A. J. Hipperson and E. J. Keefe. *Metal Industry*, v. 80, Apr. 11, 1952, p. 283-286; Apr. 18, 1952, p. 306-307.

Modern practice in joining Cu-base alloys. Comparative physical properties of steel and Cu alloys (factors affecting resistance welding) are tabulated.
(K3, P general, Cu, ST)

389-K. Furnace Brazing: Atmospheres Set the Pace. Samuel Damon. *Steel*, v. 130, May 5, 1952, p. 102-104, 127-128.

Atmospheres and requirements for specific metals. (K8)

390-K. Tricky Welding for Pipe System. Fred M. Burt. *Welding Engineer*, v. 37, May 1952, p. 37-39.

Fabrication of stainless steel process-water piping. The various cut-to-size components were rolled to the proper radius on one of four heavy-duty bending rolls and then joined by automatic and manual inert-arc welding. (K1, SS)

391-K. Willys-Overland Welds New Family Car. W. C. Henzlik. *Welding Engineer*, v. 37, May 1952, p. 44-46, 48.

Expansion spot welding, indirect gun welding, arc welding, and inspection procedures. (K1, K3, ST)

392-K. Kilowatts Save Weight. Electric Welds Eliminate Weight and Make Fairing Surfaces Clean. William P. Brotherton. *Western Machinery and Steel World*, v. 43, Apr. 1952, p. 104-106.

See abstract of "Kilowatts Don't Weigh Anything", *Welding Journal;* item 362-K, 1952. (K3, SS)

393-K. Arc Welding of Metallic Joints in Light Alloys. (In French.) A. Klopfert. *Revue de l'Aluminium*, v. 29, Feb. 1952, p. 51-56.

Applications of automatic flash welding to Al-alloy tubular and structural sections. Application in building construction. (K1, T26, Al)

394-K. Soldering of Aluminium. (In German.) L. Rostosky. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 10-14.

Historical survey. Choice of soldering alloy; procedures; examples of application. (K7, Al, SG-f)

395-K. Araldit Bonding of Light Metals. (In German.) *Aluminium*, v. 28, Jan.-Feb. 1952, p. 14-19.

Form of bonding agents, chemical and physical properties, hardening data, behavior of bonds between Al-Mg-Si and other alloys. Effect of amount of overlap on strength. Practical applications. Tables, graphs, and diagrams. (K12, Al)

396-K. Welding of Light-Metal Cables by Means of an Aluminothermic Method. (In German.) R. Frey. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 28-31.

Apparatus and procedure.
(K4, Al)

397-K. Synthetic-Resin Adhesives for High-Strength Bonding of Metals. (In German.) E. W. Pleines. *Aluminium*, v. 27, Oct. 1952, p. 40-44.

Particularly British experiences with Araldit and Redux types. Diagrams. (To be continued.) (K12)

398-K. Roll Welds for Joining Boiler Tubes to High-Pressure Vessels. (In German.) H. Elsässer. *Brennstoff-Wärme-Kraft*, v. 4, Mar. 1952, p. 80-83.

Procedure, weld design, mechanical properties of welds, and test methods. Diagrams, tables, and photographs of joints.
(K5, Q general, ST)

399-K. Influence of Chemical Composition of Certain Binary Aluminum Alloys on Their Tendency Toward Formation of Cracks During Gas Welding. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 1-6.

A study was made for Al-Sn, Al-Si, Al-Cu, Al-Mg, and Al-Zn alloys. Data are tabulated, charted, and illustrated. (K9, Al)

400-K. Comparison of the Properties of Welds in 18-8 Steel Joined by Argon Arc and Other Methods of Fusion Welding. (In Russian.) A. Ia. Brodskii. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 6-10.

Microstructures and other properties of welds obtained by various methods. The argon arc gave the best welds; oxy-acetylene the poorest. Data are tabulated and charted.
(K1, K2, SS)

401-K. Determination of Initial Values During Calculations of Regulators for Three-Phase Arc Welding. (In Russian.) D. A. Armatsev. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 11-13.

Mathematical analysis. (K1)

402-K. Choice of Method of Welding and Apparatus for Preparation of Frameworks for Reinforced Concrete Buildings. (In Russian.) I. S. Dmitriev. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 17-20.

Discussed and classified in tabular form. (K general, T26, CN)

403-K. Contact Butt Welding of Tubes With Resulting Upsetting. (In Russian.) G. V. Nedzvetskii. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 21-22.

Quality and strength of upset butt welded steel tubes. (K1, CN)

404-K. Weld Fabrication of Nickel Apparatus. (In Russian.) I. Z. Kagan. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 24-25.

Oxy-acetylene and argon-arc welding of Ni sheet. Data are tabulated.
(K1, K2, Ni)

405-K. Construction Technique for Large Aluminum Storage Tanks. (In Italian.) *Alluminio*, v. 21, Jan. 1952, p. 65-88.

Selection of material, calculation of thickness, construction and installation patterns, and inspection. Tabular data, photographs, and schematic diagrams. 42 ref.
(K general, T26, Al)

406-K. Recent Researches on the Arc Welding of Thick Aluminium Alloy Plate. P. T. Houldcroft, W. G. Hull, and H. G. Taylor. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures", Feb. 1952, p. 12-43; disc., p. 78-130.

Previously abstracted from condensed version in *Welding and Metal Fabrication;* item 148-K, 1952.
(K1, Al)

407-K. Practical Aspects of the Argon-Arc Welding of Aluminium Alloys. J. R. Handforth. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structure", Feb. 1952, p. 44-77; disc., p. 78-130.

Previously abstracted from condensed version in *Welding and Metal Fabrication;* item 148-K, 1952.
(K1, Al)

408-K. The Properties and Driving of Large Aluminium Alloy Rivets. J. C. Bailey. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures", Feb. 1952, p. 133-154; disc., p. 176-216.

Progress since 1946—development of Al alloy rivets larger than ⅝ in. diameter. Investigations on manufacture and characteristics of such rivets and techniques of driving them with standard equipment, both hydraulic and pneumatic. Mechanical properties of rivet alloys in the form of extruded bar stock are tabulated, as well as pressures required to form various shapes of driven points by squeeze riveting. Shear-strength values for hammer and squeeze-driven rivets are also given.
(K13, Al)

409-K. The Design Characteristics of Aluminium Riveted Joints. S. C. Redshaw. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures", Feb. 1952, p. 155-175; disc., p. 176-216.

From results of extensive program tests on double shear joints, effects of variations in joint materials and proportions are considered. Graphs and illustrations. (K13, Al)

410-K. Latest Developments in Weld Repairing of Steel Castings. (Concluded.) R. A. Willey. *Industry & Welding*, v. 25, May 1952, p. 37-38, 40, 72-75.

Defects were cast in the test plate and then welded with the electrode under survey. Transverse mechanical properties of the weld metal were obtained by machining 0.505-in. tensile bars from 1-in. sections cut at right angles to the direction of the weld-metal passes.
(K1, Q general, CI)

411-K. Improved Brazing Techniques For Increased Production. *Industry & Welding*, v. 25, May 1952, p. 52, 54-55, 96-97.
(K8)

412-K. Elements of Resistance Welding. A. E. Rylander. *Industry & Welding*, v. 25, May 1952, p. 62-63, 65-66, 68-72.

A review. Diagrams. (To be continued.) (K3)

413-K. Get Better Welds With Iron Powder Backup. *Iron Age*, v. 169, May 8, 1952, p. 116-118.

Iron powder has been successfully used as backup material for welds on SAE 1015 and 1025 steels. Hardening, resulting from rapid heat dissipation, is counteracted, and the need for chiseling out and rewelding the root of the seam is eliminated. Powder is pressed into narrow sheet metal channels and slightly sintered. Unsintered powder bars, in as-pressed form, can be bent somewhat and are suitable for pipeline welding. (K general, H general, CN)

414-K. Metal Stitching Can Help To Reduce Costs of Fastening. *Machine Design*, v. 24, May 1952, p. 151-153.

Includes equipment diagrams and illustrations; table of recommended thicknesses for various metal-metal and metal-nonmetal combinations.
(K13)

415-K. Automatic Welding Design for Economical Production of Moderate Quantities. John Mikulak. *Machine Design*, v. 24, May 1952, p. 170-172, 224, 227-228.

See abstract of "Product Design for Welding", *Welding Journal;* item 134-K, 1952. (K1)

416-K. Welded Construction Simplifies Drilling and Reaming Fixture. E. W. Obringer. *Machinery* (American), v. 58, May 1952, p. 152-153.

Drilling and reaming fixture of welded construction for a large irregular-shaped part. (K1, T6, ST)

417-K. Brazing the Modern Way. (Continued.) Lester F. Spencer. *Machinery* (American), v. 58, May 1952, p. 161-165.

Methods of brazing various materials. Diagrams and illustrations.
(K8, ST, Cu, Ni, CN, SS)

418-K. Control of Weld Cracking. *Metal Progress*, v. 61, May 1952, p. 116, 118, 120, 122. (Condensed from "Control of Cracking in Arc Welding High-Tensile Structural Steels." C. L. M. Cottrell, M. D. Jackson, and J. G. Whitman.)

Previously abstracted from *Welding Research.* See item 673-K, 1951.
(K3, K9, AY)

419-K. Embrittlement of Welds. *Metal Progress*, v. 61, May 1952, p. 168, 170, 172. (Condensed from "Microcracks and the Low-Temperature Cooling Rate Embrittlement of

Welds." A. E. Flanigan and M. Kaufman.)

Previously abstracted from *Welding Journal.* See item 107-K, 1952. (K9, Q23, CN)

420-K. Pipe Welding in the Oil Industry; a Description of Current Techniques in the Welding of Oilwell and Refinery Piping. Rolt Hammond. *Petroleum,* v. 15, May 1952, p. 124-126. (K general, ST)

421-K. Methods of Assembly in Fabricated Work. J. Floyd. *Sheet Metal Industries,* v. 29, May 1952, p. 405-407, 411.

Electric arc welding. Forming and erecting of all-welded, mild-steel tank. (K1, CN)

422-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Seferian. *Sheet Metal Industries,* v. 29, May 1952, p. 441-446.

Refining effect of the electrode coating, refining by reducing agents, slag-metal equilibrium, and the Mn equilibrium. Numerous graphs and tabular data. (To be continued.) (K9, K1)

423-K. Discussion on Higher Tensile Steel Chain and Chain Slings. W. Gibson Biggart. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 95, pt. 4, 1951-52, p. 181-194.

Additional discussion of paper published in v. 95, pt. 3, 1951-52; item 299-K, 1952. (K3, K1, Q27, CN)

424-K. Industrial Brazing; Design and Strength of Brazed Joints. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 146-149; May 1952, p. 182-188.

Correlates and analyzes data for various brazing alloys and metals joined. Recommended joint designs. Tables, graphs, and diagrams. (K8, SG-f)

425-K. The Twin-Arc Process. W. D. Waller. *Welding and Metal Fabrication,* v. 20, May 1952, p. 162-168.

Process and equipment. Advantages, characteristics, applications, and cost data. New electrodes designed for mild steel. Photographs, tables, and graphs. (K1, CN)

426-K. Extensions at the Llandarcy Refinery. *Welding & Metal Fabrication,* v. 20, May 1952, p. 169-173.

A training and testing plan and various welded fabrications, including a stainless steel lining, in connection with construction program at refinery in South Wales. (K9, SS)

427-K. Welding Methods for Schwinn Bicycles. Clyde B. Clason. *Welding Engineer,* v. 37, May 1952, p. 34-36.

Work at Arnold, Schwinn & Co., Chicago. Joints flash welded are: seat post to crank hanger; bottom bar to crank hanger; top and bottom bars to head. Top bar is braze welded to the seat post. Center bar is silver brazed to seat post and to the bottom bar. (K3, K8, CN)

428-K. Jiffy Joining Chart. *Welding Engineer,* v. 37, May 1952, p. 51.

Gas-welding processes you may select in order to join a given material to a similar or dissimilar metal. Includes fusion welding, braze-welding, and brazing. (K2, K8)

429-K. Values of Permissible Stresses in Welded Joints in Metallic Construction. (In Russian.) G. A. Nikolaev. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 3-4.

Specifications and design data for welds in structural steels, also for electrodes used. (K general, T26, CN)

430-K. Development of Formulas for Welded Construction for Metals Having Various Plastic Properties. (In Russian.) G. P. Mikhailov and L. A. Kaplan. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 6.

Derivation of the formulas. Includes graphical interpretation. (K general)

431-K. Automatic Three-Phase Arc Welding of Thick "15M" Steel. (In Russian.) K. V. Liubovskii, B. I. Lazarev, and M. M. Timofeev. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 7-10.

Experiments on three-phase arc welding and on development of special fluxes are claimed to be the basis for wide introduction of this method into industry, especially for the production of thick-walled vessels and similar construction. Macrographs, tables, and diagrams. (K1, CN)

432-K. Nature and Role of the Melting Process During Flash Welding. (In Russian.) A. S. Gel'man, K. P. Imshennik, and N. S. Kabanov. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 11-15.

High-speed motion pictures and oscillographs were used to study the flash welding of steel. (K3, ST)

433-K. Certain Characteristics of Flux-Submerged Welding Arcs. (In Russian.) N. G. Ostapenko. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 15-21.

An oscillographic study was made. Data are tabulated and illustrated. 11 ref. (K1)

434-K. Automatic Welding of Chemical Apparatus. (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 24-26.

Welding practices. (K1, CN)

435-K. Repairing Thin-Walled Iron Castings Using Bimetallic Electrodes. (In Russian.) N. A. Rybchinskii. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 28-29.

Repair of cracks in soil pipe and similar articles. Micrographs and illustrations. (K1, CI)

436-K. (Book) **Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures. 1952.** 223 pages. Aluminium Development Association, 33 Grosvenor St., London, W.1, England.

Foreword and remarks are followed by two sessions, one on welding and one on riveting—each consisting of two papers, joint discussion and authors' replies. Concludes with a summary of the discussions and a list of those present. Separate papers are individually abstracted. (K general, Al)

437-K. (Book) **Structural Adhesives; the Theory and Practice of Gluing With Synthetic Resins.** 203 pages. 1951. Lange, Maxwell & Springer, Ltd., 41-45 Neal St., London W.C.2, England.

A series of lectures presented at a summer-school course given in Cambridge, England, by Aero Research, Ltd. (K12)

438-K. (Book) **The Welding of Nonferrous Metals.** E. G. West. 553 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $8.50.

Weldability, properties important in welding, the fusion welding process, resistance welding, pressure welding. Separate chapters discuss welding of specific groups of metals and alloys. (K general, Al, Cu, Pb, Zn)

L

CLEANING, COATING AND FINISHING

422-L. Measurements on Thin Iron Films. A. Van Itterbeek, L. De Greve, and F. Heremans. *Applied Scientific Research,* sec. B, v. 2, No. 4, 1952, p. 320-324.

Curves are established for the specific resistance as a function of thickness for Fe films obtained respectively by sputtering or condensation in vacuum. The curves obtained with these two techniques are completely different. Electron microscope and electron diffraction pictures given. (L25, S14, Fe)

423-L. A Method for the Investigation of Electropolishing Problems. K. F. Lorking. *Australasian Engineer,* Feb. 7, 1952, p. 58-61. (From Symposium on "The Surface Treatment of Metals".)

Method based on technique developed by Hull and his co-workers for the investigation of optimum electroplating conditions. They designed a cell in which both electrodes are plates of metal placed vertically but not parallel to each other, so that the current density varies along the length of the cathode. In this manner the range of finishes produced over a wide range of current density may be investigated on the one electrode. (L13)

424-L. Bright Dipping. R. G. Stewart. *Australasian Engineer,* Feb. 7, 1952, p. 61-63. (From Symposium on "The Surface Treatment of Metals.")

The process has been applied primarily to Cu and Cu-base alloys and also used extensively for Cd and Zn plating. It produces a brightening of the surface and also provides some passivation of the treated surface. The composition of the dip is determined by the composition of the material and the result desired. (L16, Cu)

425-L. Chromium Plating With the Bornhauser Chrome Solution. Frank Taylor. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 109-113.

Operation and applications of the process together with details of the composition and maintenance of the solution. (L17, Cr)

426-L. Modified Bronze Plating as a Substitute for Nickel. G. Schmerling. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 115-118.

The requirements necessary for an alternative for Ni. Research with various alloys which have been tried as substitutes. The modified bronze or Nickelex process is considered a genuine substitute. (L17, Cu, Sn)

427-L. P. R. Copper Plating. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 119-120.

New Westinghouse patents are reviewed. (L17)

428-L. Modern Electroplating and Metal Finishing Processes. H. Cann. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 120.

Taken from a talk given to the London Section of the Institution of Production Engineers. Applications for electrodeposition. (L17)

429-L. Some Experience With a Proprietary Red Bronze Plating Solution as a Substitute for Nickel. F. S. Duc. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 123.

The process and information on corrosion resistance. (L17, R general, Cu)

430-L. Drying and Finishing Ovens. Part III and IV. J. D. Russell. *Industrial Heating,* v. 19, Mar. 1952, p. 495-496, 498, 500, 502; Apr. 1952, p. 687-688, 690, 692, 699-700.

Part III: Horizontal wicket-type ovens for mass-production baking of flat sheet stock. Part IV: The tip-up oven and the vertical oven. Importance of effective air recirculation and a typical oven application—heat processing of a household refrigerator. (L26)

431-L. Production Finishing of Automotive Parts in Electric Radiant Panel Ovens. *Industrial Heating,* v. 19, Apr. 1952, p. 694, 696.

Procedures at the Detroit plant of Metal Mouldings Corp. (L general)

432-L. Vapor Deposition May Solve Today's Coating Problems. I. E. Campbell and C. F. Powell. *Iron Age,* v. 169, Apr. 10, 1952, p. 113-117.

Use for applying refractory coatings. Process can be continuous and is generally carried out at atmospheric pressure. Induction or resistance heating gives highest efficiencies, and temperature of surface being coated is most critical factor. Wire, rod, tubing, strip and shapes have been successfully coated. Tabular data gives types of coatings that can be vapor deposited. (L25, SG-h)

433-L. The Formation of Refractory Coatings by Vapor-Deposition Processes. Carroll Powell and I. E. Campbell. *Journal of Chemical Education,* v. 29, Apr. 1952, p. 181-186.

See abstract of "Vapor Deposition May Solve Today's Coating Problems", *Iron Age;* item 432-L, above. (L25, SG-h)

434-L. Unusual Chromium-Plating Problems. Alan W. Brown. *Machinery* (American), v. 58, Apr. 1952, p. 162-166.

Work on a variety of problems by Cro-Plate Co., Hartford, Conn. Includes preliminary abrasive-blasting operation. Steels and Al alloys are the principal base metals mentioned. (L17, ST, Cr, Al)

435-L. Barrel Finishing: an Economical Means of Processing Small Die Castings. H. K. Barton. *Machinery* (London), v. 80, Mar. 27, 1952, p. 555-560.

Covering mechanical actions involved, types of barrels, effects of barrel shape and overloading, and functions and kinds of carriers. Diagrams. (L10)

436-L. Wet Blasting Performs Many Cleaning and Finishing Operations. John L. Everhart. *Materials & Methods,* v. 35, Apr. 1952, p. 98-100.

Versatility of blasting with an abrasive suspended in a liquid. (L10)

437-L. Aluminum Photographic Process Has Industrial Applications. Eugene Wainer. *Materials & Methods,* v. 35, Apr. 1952, p. 176, 178, 180, 182, 184, 186.

See abstract of "Photos on Aluminum Resist Heat and Scratching", *Iron Age;* item 89-L, 1952. (L14, T9, Al)

438-L. The Formation of Metallic Coatings by Vapor-Phase Techniques. C. F. Powell and I. E. Campbell. *Metal Finishing,* v. 50, Apr. 1952, p. 64-69.

See abstract of "Vapor Deposition May Solve Today's Coating Problems", *Iron Age;* item 432-L, above. (L25, SG-h)

439-L. Silver Plating. J. B. Mohler. *Metal Finishing,* v. 50, Apr. 1952, p. 72-75.

Plating with the cyanide silver bath. Evaluates three formulas. Operating conditions and effects of increasing chemicals, temperature, and agitation. Tables. (L17, Ag)

440-L. Electroplating With Aluminum. Nelson F. Murphy. *Metal Finishing,* v. 50, Apr. 1952, p. 76-79.

Some of processes, shortcomings, and needs for future research. 32 ref. (L17, Al)

441-L. Modified-Bronze Plating. G. Schmerling. *Metal Industry,* v. 80, Apr. 4, 1952, p. 267-268.

See abstract of "Modified Bronze Plating as a Substitute for Nickel". *Electroplating and Metal Finishing,* item 426-L above. (L17, Cu, Sn)

442-L. Modern Theories of Adhesion and Its Measurement. L. Reed Brantley and Gordon Carpenter. *Official Digest,* Jan. 1952, p. 57-64.

Factors influencing adhesion of organic coatings to metals are broadly grouped into two classifications, physical and chemical. 26 ref. (L26, ST, Al)

443-L. Hot Applied Coal Tar Coatings. N. T. Shideler. *Pipe Line News,* v. 24, Apr. 1952, p. 34-37.

Raw materials used, the coatings and their manufacture, and the coating process in mill and field, for pipeline. Tabular data. (L26, CN)

444-L. Finishes Suitable For Powdered Metal Parts. *Precision Metal Molding,* v. 10, Apr. 1952, p. 83-87.

Because of their fundamentally porous nature some difficulty has been encountered in application of standard finishing techniques to parts produced from metal powders. However, there are a number of finishes which are pleasing and corrosion resistant. Electroplated and black-oxide finishes and modifications of phosphate-coating processes. (L general, H general)

445-L. Preparation and Maintenance of Copper and Zinc Plating Baths Using Substitute Methods. Myron B. Diggin. *Products Finishing,* v. 16, Apr. 1952, p. 40, 42, 44, 46, 48, 50, 52, 54.

Various substitute bath compositions, often necessary because of shortages of certain chemicals. (L17, Cu, Zn)

446-L. Metallizing for Corrosion Prevention. Gilbert C. Close. *Products Finishing,* v. 16, Apr. 1952, p. 58-65.

The process and its applications. Recommended coatings for salt, industrial, and rural atmospheres and for immersion in fresh and sea water, are tabulated. (L23)

447-L. Spotlighing Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, Apr. 1952, p. 66, 68, 70, 76, 78, 82, 84, 86, 88, 90, 92, 94, 96.

Reviews recent work on phosphate coatings on metal; examining the adhesion of paint to steel; adherence of Co ground-coat enamels; and possibilities of Sb plating. (L general)

448-L. Automatic Setup for Spray Painting Shells. A. W. Gudge. *Products Finishing,* v. 16, Apr. 1952, p. 98-100.

Procedures and equipment at Binks Mfg. Co., Chicago. (L26)

449-L. The Theory and Practice of Vitreous Enamelling. (Concluded) J. H. Gray. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 361-366.

Basic principles and requirements of the vitreous enameling process for castings. Frit formulas and production pointers. (L27, CI)

450-L. Electroplating and Mill Maintenance. Charles H. Belvin. *Southern Pulp and Paper Manufacturer,* v. 15, Apr. 10, 1952, p. 48, 50, 52, 54, 56.

Use of Cr and Ni for electroplating and reconditioning worn drums and rolls in the paper industry. (L17, Cr, Ni)

451-L. Oxide Films on Electrolytically Polished Copper Surfaces. J. A. Allen. *Transactions of the Faraday Society,* v. 48, Mar. 1952, p. 273-279.

Surfaces of polycrystalline Cu sheet polished electrolytically in H_3PO_4 were examined by an electrometric technique and by electron diffraction. The surfaces are initially free from oxide films when removed from the polishing bath. The subsequent growth of oxide films in air at room temperature depends on the washing procedure adopted. (L13, Cu)

452-L. The Metallizing Process. F. Keller. *Welding Journal,* v. 31, Apr. 1952, p. 291-295.

Brief historical review of the metallizing process; its field of application, apparatus needed, methods used in preparation of surfaces, the nature of the coatings and some applications. (L23, R)

453-L. Hard-Facing Spiral Surfaces. G. E. Kabacy. *Welding Journal,* v. 31, Apr. 1952, p. 340. (L24)

454-L. The R.A.E. Hot Half-Hour Chromate Bath for the Protection of Magnesium Alloys. L. F. LeBrocq and H. G. Cole. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 1-50.

The effect of temperature, concentration, salt ratio, and pH on the production of chromate films on pure Mg and alloys was examined in detail. Influence of variations in composition likely to occur during prolonged use of the hot half-hour chromate bath, and of impurities likely to gain access to the bath. A method for restoring a much-used bath to a freshly prepared condition. (L14, Mg, Cr)

455-L. Control of Sulphuric Acid Anodic Baths. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 51-55.

Specimens of sheet Al and duralumin were anodized in an experimental bath at 70-80° F. using a P.D. of 12 v. Observations were made of current consumption and change in weight of specimens. (L19, Al)

456-L. Control and Simplification of Bengough Anodic Process. J. W. W. Willstrop. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 56-66.

Tests were made with baths of various strengths of CrO_3 at constant temperature and at various stages of exhaustion. A method of determining the amount of film produced was developed, and quantity of film produced, current consumption and solution of metal compared for the treatment of Al and duralumin sheet in various solutions under different conditions of voltage control. (L19, Al)

457-L. Treatment in Cold Chromate Baths of Magnesium Alloy Parts Previously Treated in the Acid Chromate Dip and Lanolined. H. G. Cole and E. Parry. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 67-71.

Experiments were made on methods of chemical cleaning of Mg alloy parts prior to chromate treating in cold electrolytic and cold immersion baths. The parts were treated in the acid chromate dip and then lanolined. (L14, Mg)

458-L. Cleaning and Re-Chromate Treatment of Magnesium Alloy Castings, With Special Reference to Corroded Parts Machined to Close Limits. L. F. LeBrocq and Fl.-Lt. Rakowski. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 72-86.

Methods of cleaning and rechromating finished Mg alloy castings which were chromate treated before machining, or which had become lightly corroded in store or in service. (L14, Mg)

459-L. Note on the Treatment of Magnesium Alloy to Specification D.T.D. 118 in Cold Chromate Baths (Baths i and ii of Specification D.T.D. 911) after Preliminary Treatment in the Acid Chromate Dip (Bath iv of Specification D.T.D. 911). M. K. Petch. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 87-89.

Results of test show that the R.A.E. electrolytic and cold chromate treatments, applied to mate-

rial to Specification D.T.D. 118 treated in the acid chromate dip, are not as protective as when applied to bare metal. Pre-existing film should, therefore, be removed before the treatments are applied. (L14, Mg)

460-L. Chromate Treatments for Magnesium Alloys With Special Reference to Cold Baths. L. F. LeBrocq. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 90-119.

Experiments were made with the object of evolving cold chromate treatments of simple immersion or electrolytic types for Mg alloys. An immersion bath of composition Na_2Cr_2O (hydrated) 10%, potash alum 10%, $KMnO_4$ 5%, gave results equal to those obtained with the hot bath, when used in conjunction with paints. An electrolytic bath of composition $Na_2Cr_2O_7$ (hydrated) 15%, $KMnO_4$ 5%, caustic soda 0.2%, gave results superior to those obtained with the hot bath under the same conditions. (L14, Mg, Cr)

461-L. Electrolytic Polishing of Aluminium Alloys. B. W. Mott and E. C. W. Perryman. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 120-126.

Two electrolytes were investigated. Various alloys up to an alloying content of 20% were polished both electrolytically and mechanically for comparison of the surfaces obtained. Tests were made to find the effects of varying the current density, using a stirrer during polishing and changing the position of the electrodes. (L13, Al)

462-L. Methods of Removal of Corrosive Perspiration Deposits From Steel. S. G. Clarke and E. E. Longhurst. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 127-132.

The degree to which ordinary degreasing with trichlorethylene will remove sweat residues, and the efficiency of methanol in comparison with other methods. Investigation showed that fingermarks can cause marked corrosion of unprotected steel. Laboratory tests of some 20 possible removers showed the following as giving satisfactory results: methanol, certain neat soluble oils followed by washing, certain soluble oil emulsions used hot, water with a suitable inhibitor used hot or cold or in conjunction with a water displacer. (L12, R5, ST)

463-L. A Bright Dip for Steel. G. E. Gardam. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 133-134.

Process which produces a bright metallic luster on mild steel, medium carbon, plain and alloy steels. The surface, however, is not sufficiently smooth to give clear image reflection but a method of improving the appearance of tarnished, corroded, pickled or similar surfaces is provided. Composition of the dip and the technique. (L16, CN, ST, AY)

464-L. Protection of Steel by Different Lanolin Solutions. S. G. Clarke and E. E. Longhurst. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 135-139.

Tests were carried out on mild steel plates treated by dipping in lanolin solutions of a range of strengths in white spirit, solvent naphtha, and pure benzene. The results of tests and the effects of temperature of application are tabulated and represented graphically. (L26, ST)

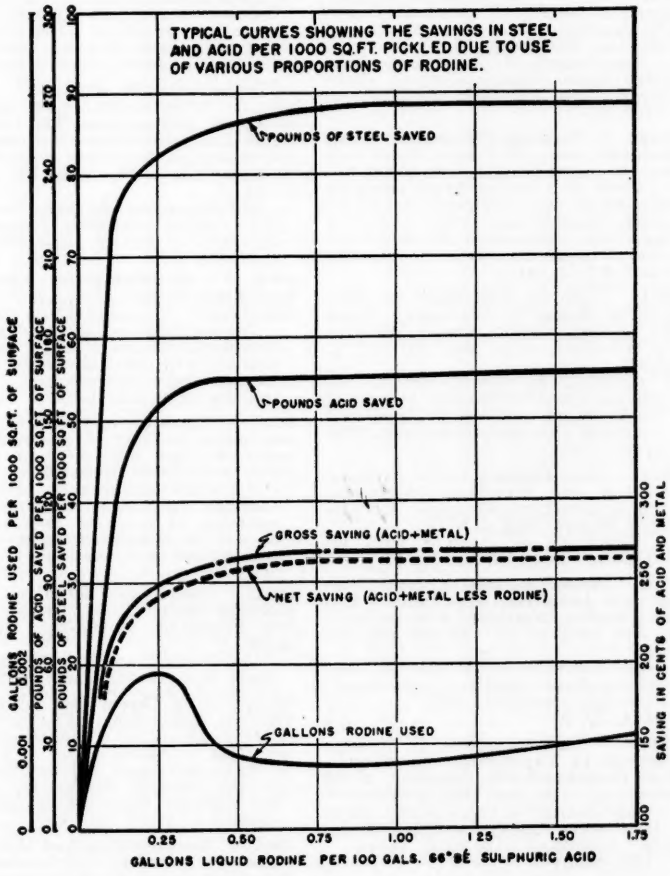
AMERICAN CHEMICAL PAINT COMPANY

AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet

Subject: EFFICIENT PICKLING WITH "RODINE"®

A. SAVINGS POSSIBLE WITH "RODINE"


TYPICAL CURVES SHOWING THE SAVINGS IN STEEL AND ACID PER 1000 SQ.FT. PICKLED DUE TO USE OF VARIOUS PROPORTIONS OF RODINE.
POUNDS OF STEEL SAVED
POUNDS ACID SAVED
GROSS SAVING (ACID+METAL)
NET SAVING (ACID+METAL LESS RODINE)
GALLONS RODINE USED
GALLONS RODINE USED PER 1000 SQ.FT. OF SURFACE
POUNDS OF ACID SAVED PER 1000 SQ.FT. OF SURFACE
POUNDS OF STEEL SAVED PER 1000 SQ.FT. OF SURFACE
SAVING IN CENTS OF ACID AND METAL
GALLONS LIQUID RODINE PER 100 GALS. 66°BÉ SULPHURIC ACID

B. TYPICAL APPLICATION OF "RODINE"

Pickling shell cases in uninhibited muriatic or sulfuric acid contributes to their embrittlement and makes it difficult to draw them without breakage. By adding a small amount of "Rodine" to the pickle bath, embrittlement is suppressed and more than enough acid is saved to pay the costs of the inhibitor.

CHEMICALS ACP PROCESSES **WRITE FOR DESCRIPTIVE FOLDER ON "RODINE" AND INFORMATION ON YOUR OWN PICKLING PROBLEM.** CHEMICALS ACP PROCESSES

465-L. The Water Vapour Permeability of Organic Coatings. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 140-148.

Methods for the meaurement of water vapor permeability. An investigation also embraced pigmented organic coatings with a view to ascertaining whether there is any relationship between water vapor permeability and the protective properties of paint films. A table gives the results obtained for a number of samples. Possible sources of error. (L26)

466-L. The Influence of Surface Contamination on the Corrosion of Magnesium Alloy Sheet to Specification D.T.D. 118. L. Rakowski. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 187-215.

Difficulties experienced in obtaining uniformity of chromate films, under various conditions, were investigated. The conclusions show the importance of insuring the highest possible cleanliness of the surface of the sheet material prior to chromating. (L14, Mg)

467-L. Protection of Magnesium Alloys Against Corrosion by Electrolytic Chromate Films. M. K. Petch. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 216-226.

Conditions were investigated under which chromate films can be formed on Mg alloy anodes and cathodes in solutions of CrO_3 and of $K_2Cr_2O_7$. The protective efficiencies of the more promising treatments were determined. (L14, Mg)

468-L. The Chemical Analysis of Cyanide Zinc Plating Solutions. A. Bacon. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 227-236.

A method for the chemical analysis of Zn cyanide plating solutions. Rapid routine methods applicable to a wide range of electrolytes. (L17, S11, Zn)

469-L. Test for Traces of Zinc in Nickel Plating Baths B. S. Evans. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 245-247.

Method for estimating small concentrations of Zn in Ni plating baths. It can also be used as a rapid test to determine whether a given Ni plating solution contains more than a limiting concentration of Zn. The reagents required for the test, and the results of trials on test solutions. (L17, S11, Zn, Ni)

470-L. Estimation of Nickel, Cobalt, Chloride, Formate and Formaldehyde in Nickel-Cobalt Plating Solutions. F. W. Salt. "Protection and Electro-Depositions of Metals", His Majesty's Stationery Office (London), 1951, p. 248-250.

(L17, S11, Li, Co, Cl)

471-L. Revised Methods of Analysis of Chromium Plating Solutions. F. W. Salt. "Protection and Electro-Deposition of Metals". Mis Majesty's Stationery Office (London), 1951, p. 251-254.

In the method described, all the constituents, including H_2SO_4, may be determined in about 1½ hr., whereas the earlier method took at least 4 hr. (L17, S11, Cr)

472-L. Selenium Coatings for the Protection of Magnesium Alloys Against Corrosion. L. F. LeBrocq and H. G. Cole. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 259-266.

Se deposited by a dry method gave as good protection to Mg alloy sheet to D.T.D. 120A and to propeller blade material as the hot half-hour chromate bath, and provided an equally good base for paint. (L14, Se)

473-L. Inspection Tests for the Adhesion of Electroplated Coatings With Particular Reference to the B.N.F. Adhesion Test. A. W. Hothersall and C. J. Leadbeater. "Protection and Electro-Deposition of Metals", His Majesty's Stationary Office (London), 1951, p. 282-294.

In addition to the B.N.F. adhesion test, which is carried out with the aid of a vibrating ball-ended hammer actuated by a fluctuating magnetic field, the shot impingement and the electrolytic test are described. (L17)

474-L. Preparation of Magnesium Surfaces for Painting. H. A. Barbian. *American Paint Journal,* v. 36, May 5, 1952, p. 31, 34.

Chemical treatments, especially those using products of Dow Chemical Co., Midland, Mich. (L26, L14, Mg)

475-L. The Properties of Metallic Coatings Produced by Evaporation and Sputtering. S. Tolansky. *Electrodepositors' Technical Society,* Advance Copy 3, 1952, 11 pages.

Methods, and characteristics of the deposits in so far as they have a bearing on problems associated with electrodeposition. (L25, L17)

476-L. Practical Considerations in the Application of Vacuum Coating for Metal Finishing. L. Holland. *Electrodepositors' Technical Society,* Advance Copy 4, 1952, 12 pages.

Design of tungsten filaments, rate of evaporation, effect of vapor incidence on Al film structure, design of workholders, glow-discharge bombardment, effects of contaminating vapors, reflectivity of evaporated Al films, and conclusions. (L25)

477-L. Lacquering to Obtain Brilliance and Metallic Lustre. H. H. Vevers and G. E. Gardam. *Electrodepositors' Technical Society,* Advance Copy 5, 1952, 8 pages.

Types of lacquer used for the base and top coats; methods of application and firing. The principle of the process is demonstrated by two simple experiments. In the usual type of application, a metallic coating is vacuum-deposited in a very thin film onto a surface which has been lacquered. A further lacquer coating is then applied to protect the metallic film. (L26, L25)

478-L. The Electrodeposition of Tin-Antimony Alloys From Chloride-Fluoride Electrolytes. J. W. Cuthbertson and N. Parkinson. *Electrodepositors' Technical Society,* Advance Copy 6, 1952, 7 pages.

Preliminary investigation shows that alloys of Sn and Sb containing up to about 45% Sb can be satisfactorily deposited from solutions containing the chlorides of the two metals, a fluoride, and an addition agent. Results so far obtained are encouraging, and the fact that bright plate can be deposited is noteworthy. (L17, Sn, Sb)

479-L. The Plating of Aluminium Articles as a Production Process. A. W. Wallbank. *Electrodepositors' Technical Society,* Advance Copy 7, 1952, 9 pages.

Various processes, with emphasis on one which has been in use for many years by practical platers and which has yet to be equalled in its own particular field by a process of laboratory origin. Cleaning, etching, and plating solutions for deposition of Ni, Zn, and brass on Al. (L17, Al, Ni, Zn, Cu)

480-L. Source of Defect-Producing Hydrogen in Porcelain-Enameled Steel. *Journal of the Franklin Institute,* v. 253, Apr. 1952, p. 343-345. (A condensation.)

A study using heavy hydrogen as a tracer indicates that H_2O present in the frit used in the coating is largely to blame for the defects. Experiments demonstrate feasibility of avoiding defects by using a H_2O-free frit. (L27, ST)

481-L. Aluminum Foil Stops Corrosion. *Iron Age,* v. 169, May 1, 1952, p. 147.

Method for sealing vehicles for storage and shipment to exclude water, developed and tested during the past 4 years at Letterkenny Ordnance Depot, Chambersburg, Pa. A bituminous mastic compound, Al foil, and an Al paint are used. The method has been adopted for use by the Ordnance Corps. (L general, Al)

482-L. High Temperature Coatings. Frederick D. Shaw. *Organic Finishing,* v. 13, Apr. 1952, p. 15-18.

Processes for application of ceramic or ceramic-metal types. Preparation of metal and ceramic slip. (L27)

483-L. Coating of Strip at the Thomas Strip Division, Pittsburgh Steel Company. *Plating,* v. 39, May 1952, p. 470-474.

Low-carbon, high-carbon, spring and alloy steel strip are processed. (L17, AY, CN)

484-L. Calibration of Plating Range Cells. J. B. Mohler. *Plating,* v. 39, May 1952, p. 475-476, 481.

Results of research on cells used as laboratory tools for electroplating control and experimentation. The slot cell and its calibration are emphasized. Current-density-distribution equations. (L17)

485-L. Chromium Plating Speed Tables. Eugene L. Combs. *Plating,* v. 39, May 1952, p. 482-485.

Relationship between temperature, current density, and current efficiency for the two standard Cr plating solutions. The current density is expressed both in amp. per sq. ft. and in amp. per sq. in. (L17, Cr)

486-L. Iron Plating Electrotypes and Stereotypes. Axel Lundbye. *Printing Equipment Engineer,* v. 82, Apr. 1952, p. 27-29.

(L17, Fe)

487-L. Ceramic Coating Saves Scarce Metals and Lengthens Life of High Temperature Parts. Hugh Penton. *Western Metals,* v. 10, Apr. 1952, p. 37-39.

Process by which ceramic coating is applied. The new Ryan A-418 coating. Many vital high-temperature jet-engine components, now made of Inconel, may be fabricated from Type 321 stainless steel and adapted to these same applications by the use of ceramic coatings. (L27, SS, SG-h)

488-L. Electroforming Solves Difficult Design and Fabrication Problems on New Military Items. M. H. Orbaugh. *Western Metals,* v. 10, Apr. 1952, p. 46-48.

The process and its advantages. Nickel, because of good corrosion resistance and wide limits within which its physical properties can be varied, is the most generally used metal for this process. However, practically all electroformed metals can be altered in physical properties by controlling the operating conditions and composition of the elctroforming baths. (L18, Ni)

489-L. How Navy in Seattle Refinishes Salt Water Pitted Propellers. Howard E. Jackson. *Western Metals,* v. 10, Apr. 1952, p. 49-50.

Series of steps involved include mechanical and chemical cleaning, anodizing, spray painting, etc. (L general, Al)

490-L. An Experimental Study of Electropolishing. (In French.) I. Epelboin. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C214-C218; disc., p. C218.

Discusses present theories on the degree of hydration of ions in solution. The similarity of the results obtained with baths with bases as different as ClO_4 or PO_4 indicates that the mechanism of electropolishing is the same in all cases. Results for a series of metals and simple binary alloys are tabulated and charted. 10 ref. (L13)

491-L. Light-Metal Cylinders With Hard-Chromium Contacting Surfaces. (In German.) E. Meyer-Rässler. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 33-36.

Pretreatment which improves the properties of Cr-plated surfaces, used in internal-combustion engines. Micrographs show surface appearance and internal structures of the deposits. (L17, Cr, Al)

492-L. Anodized Aluminium. (In German.) A. Reuter. *Aluminium*, v. 28, Mar. 1952, p. 78-80.

Hints for avoidance of defects; influence of metallic impurities; choice of alloys for decorative effects; and surface preparation. (L19, Al)

493-L. Polishing of High-Purity Aluminum by Repeated Anodizing, and Removal of the Anodic Layer. (In German.) Richard Lattey. *Metalloberfläche*, v. 6, sec. A, Mar. 1952, p. A41-A48.

Apparatus and procedure. Influence of current density, as well as effect of repeated removal of the anodic layer upon reflection values. (L12, Al)

494-L. Grinding and Polishing of Aluminum and Aluminum Alloys, Especially Preparation for Anodic Oxidation (Eloxidation). (In German.) Richard Erdmann. *Metalloberfläche*, v. 4, sec. B, Mar. 1952, p. B36-B42.

Practical procedures for polishing and grinding, and the advantages of chemical or electrolytic polishing over mechanical polishing. (L12, L13, Al)

495-L. Electrolytic Brass Plating in Oxalic Acid Baths. (In Russian.) A. I. Stabrovskii. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 471-476.

Oxalic acid was investigated as a replacement for cyanide solutions. Satisfactory results were obtained when a gelatin was added to the bath. Data are tabulated and charted. (L27, Cu)

496-L. Porosity of Electrodeposited Nickel. (In Russian.) A. A. Sutiagina and A. P. Vagramian. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 945-950.

The influence of thickness of deposit, current density, and various surface-active materials was investigated. Some materials were found to increase and others to decrease the number of pores. Up to a limiting value, porosity decreases with increasing thickness. The porosity-current density curve passes through a minimum. Data are charted. 11 ref. (L17)

497-L. The Problem of Electrodeposition of Cobalt. (In Russian.) P. N. Kovalenko. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 951-957.

The quantitative electrodeposition of Co was investigated. Temperature, pH, and ammonium oxalate concentration were found to be the controlling variables. Tables and graphs. (L17, Co)

498-L. Photographic Description of the Oxidation of Aluminum. (In Russian.) N. I. Kirillov and A. S. Kheinman. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1019-1025.

See abstract of "Photographic Reproduction on Anodized Aluminum," *Metal Industry;* item 186-L, 1952. (L19, Al)

499-L. Criteria for Uniformity of Distribution of Metal on the Cathode and Methods for Its Determination. (In Russian.) L. I. Kadaner. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1033-1044.

Use of experimental data to calculate satisfactory criteria. (L17)

500-L. Measurements on the Formation of Thin Tin Films. A. Van Itterbeek, L. De Greve, and F. Heremans. *Applied Scientific Research*, v. 2, Sec. B, 1952, p. 352-360.

The films are sputtered in He or Ne gas. Specific resistance and also the temperature coefficient were measured as a function of thickness. The oxidation phenomenon was studied by means of change in resistance as a function of time. Finally the structure of the films was analyzed by means of the electron microscope. (L25, M27, P15, Sn)

501-L. A Radioisotope Study of Cobalt in Porcelain Enamel. William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner. *Journal of the American Ceramic Society*, v. 35, May 1, 1952, p. 113-120.

A typical porcelain enamel ground coat containing a small amount of radioactive Co as oxide was prepared, applied to sandblasted enameling iron blanks, and fired under conditions selected to give underfired, normally fired, and overfired coatings, respectively. Examination of these specimens revealed that a Co-bearing metallic deposit had been formed at the enamel-metal interface during firing, and that the enamel layer was depleted in cobalt oxide near the interface. (L27, Fe)

502-L. Ceramic Coatings. John V. Long. *Machine Design*, v. 24, May 1952, p. 122-126.

Research and results on development of coatings for heat resistant alloys for jet engines. Solaramic process which provides engine designers with a new and unique series of ceramic coatings, capable of enhancing metal life by reducing oxidation and intergranular corrosion and by stabilizing metal surfaces so they can operate for greatly extended periods at high temperatures. Service results of ceramic coated SAE 1010, 4130, and 321 stainless. (L27, CN, SS)

503-L. Aluminized Coatings. M. G. Whitfield and V. Sheshunoff. *Machine Design*, v. 24, May 1952, p. 139-140.

See abstract of "Aluminized Cast Iron", *Foundry;* item 636-L, 1951. (L16, Al, CI)

504-L. Clear Lacquers for Plated Parts. *Metal Finishing*, v. 50, May 1952, p. 57-59, 101.

Protection from corrosion or decay. Properties of paints and lacquers for Ag, brass, and Cu, with emphasis on Cr plate. (L26, Ag, Cu, Cr)

505-L. White Brass Plating. A Progress Report. W. B. Knight. *Metal Finishing*, v. 50, May 1952, p. 67-68.

See abstract from *Metal Progress;* item 381-L, 1952. (L17, Cu)

506-L. Polishers and Polishing. Charles Harris. *Metal Industry*, v. 80, Apr. 18, 1952, p. 308-310; Apr. 25, 1952, p. 326.

Shop problems and practices for metals in general. (L10)

507-L. Re-Finishing Worn Engine Cylinders. Gilbert C. Close. *Modern Machine Shop*, v. 24, May 1952, p. 118-120, 122, 124, 126, 128, 130, 132, 134, 136.

Reclamation of railroad diesel and aircraft radial-engine cylinders using "Porus-Krome", a modified hard-Cr plating process. (L17, Cr)

508-L. Protective Coating Requirements by the Bureau of Yards and Docks. *Paint and Varnish Production*, v. 42, May 1952, p. 22-23.

Applies to construction and maintenance of shore installations including Navy bases, aircraft stations, and Marine bases. Includes color schedule and preparation of surfaces and painting of steel pilings. (L general, ST)

509-L. Organic Finishing of Die Castings at Eastman Kodak. *Precision Metal Molding*, v. 10, May 1952, p. 46-47.

Pictures of a few of the finishing operations. Mentions Al and Mg. (L26, Al, Mg)

510-L. White Brass Plating. W. B. Knight. *Products Finishing*, v. 16, May 1952, p. 52, 54, 56, 58.

See abstract from *Metal Progress;* item 381-L, 1952. (L17, Cu)

511-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing*, v. 16, May 1952, p. 62, 64, 66, 70, 74, 78, 80, 84, 86, 88, 90, 92, 94, 96.

Extensive summaries and discussion of recent papers: how alkaline cleaners affect magnesium die castings; electrodeposition of aluminum; improving the fungicidal properties of organic coatings; and measurement of flexibility of lacquer films. (L general, Mg, Al)

512-L. Practical Applications of Modern Products. *Products Finishing*, v. 16, May 1952, p. 98-101.

Brief articles on corrosion protective films applied to military aircraft assemblies; new type ovens increase production of automobile accessories and trim parts; nine-stage unit processes drums; and rocking barrel blast unit cuts casting cleaning costs. (L general)

513-L. The Mechanical Surface Finishing of Metals. G. T. Colegate. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 257-268.

Polishing, polishing operations, and the various types of wheels and equipment used. (To be continued.) (L10)

514-L. Some Factors Involved in the Enamelling of Hollow-Ware. K. H. Broadfield. *Sheet Metal Industries*, v. 29, May 1952, p. 459-461.

Removal of lubricants, pickling, assembly, choice and application of enamels, drying, and fusion. (L27, CN)

515-L. Rhodium Plating. F. Spicer. *Sheet Metal Industries*, v. 29, May 1952, p. 462-464.

Operating conditions and properties of coating together with photographs of typical rhodium plated products. (L17, Rh)

516-L. Coating Metal Used in Hot-Dip Galvanizing. Part I. Wallace G. Imhoff. *Wire and Wire Products*, v. 27, Apr. 1952, p. 356-360, 420-421.

A detailed discussion of the Zn plating bath. Qualities and characteristics of Zn. (To be continued.) (L16, Zn)

517-L. Electrolytic Tinplate — Its Production and Benefits. Samuel S. Johnston. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources.", 1951, p. 191-193; disc., p. 204-210.

Tinplate is produced from two principal types of electrolytes, acid and alkaline. Important differences. Principal means for fusion of electrodeposited Sn. 10 ref. (L17, SN, ST)

518-L. The Role of Protective Coats in the Conservation of Metals. U. R.

Evans. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 223-227; disc., p. 240-244.

Advantages and disadvantages of various types. Application procedures. (L general)

519-L. Critical Potential of Deposition of Protactinium on Various Metals. (In French.) Jacques Danon and Christiane Ferradini. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 24, 1952, p. 1361-1363.

The possibility of determining the critical potential for deposition of Pa in Hf solution, using the β-ray emitter, Pa^{233}, and measuring the quantities of Pa deposited at the cathode at various potentials maintained constant during a given time. Graph. (L17, P15, Pa)

520-L. Apparatus for Vacuum Evaporation at High Pumping Speeds. (In French.) Rene Bernard and Francois Davoine. *Vide,* v. 7, Jan. 1952, p. 1136-1138.

A high-speed (230 per sec.) and low-pressure pumping installation, offering a ready means to obtain thin metallic films. Includes diagrams. (L25)

521-L. Kerosene-Oxygen Torches for Flame Cleaning Metal Surfaces. (In Russian.) L. I. Blagodatskii. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 26-27.

Design and use. (L10)

522-L. (Book) **Electrolytic Polishing and Bright Plating of Metals. Ed. 2.** S. Wernick. 244 pages. Alvin Redman, Ltd., 4, Fitzroy St., Fitzroy Sq., London, W.1. 30s.

Electrolytic polishing of stainless steels, Ni, Al, carbon steels, Cu and Ag. Industrial applications of electrolytic polishing to nonferrous metals; various processes. Bright plating in Ni, Zn, Cd, Cu, and Ag, and the deposition of Pt, Pd, and Rh. An Appendix deals with development of bright Ni plating in America. Extensive bibliography. (L13, L17)

523-L. (Book) **Protection and Electro-Deposition of Metals.** 350 pages. 1951. His Majesty's Stationery Office, York House, Kingsway, London W.C.2, England. (Selected Government Research Reports, v. 3.)

A collection of reports, selected from research work carried out under the direction of the Ministries of Supply and Aircraft Production, now combined as the Ministry of Supply. Individual papers are separately abstracted. (L17, R general)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

180-M. Applied Research Evolves New Data on the Magnesium Zirconium System. O. A. Carson and D. T. Austin. *Canadian Mining Journal,* v. 73, Apr. 1952, p. 70-75.

Results of a thesis submitted to the Department of Metallurgy at Queen's University, Kingston, Ont. Graphs and photomicrographs. 15 ref. (M24, Mg, Zr)

181-M. Scattering of Visible and Near Infrared Radiation by Layered Distributions of Small Metal Spheres. E. Lynn Cleveland and Richard C. Raymond. *Journal of the Optical Society of America,* v. 42, Mar. 1952, p. 183-186.

Effective scattering cross sections for metal spheres were measured through the resonance region, using wave-lengths between 0.45 and 15μ. Spheres of Fe and Cu sorted into reasonably narrow diameter distributions between 2 and 20μ were supported in layers on Pliofilm and AgCl. Results are in general accord with qualitative predictions based on the Mie theory. 15 ref. (M25, Fe, Cu)

182-M. The Influence of Structure on Hardness With Special Reference to Steels. H. A. Unckel. *Metallurgia,* v. 45, Mar. 1952, p. 115-120.

Details of experimental results especially on a hypereutectoid plain carbon steel and a high-Cr die steel. Tabular data and photomicrographs. (M27, Q29, CN, TS)

183-M. X-Ray Line-Broadening From Cold Worked Iron. J. H. Auld and R. I. Garrod. *Nature,* v. 169, Apr. 5, 1952, p. 579-580.

Experiments on cold-worked Fe carried out in the Defense Research Laboratories, Melbourne. (M22, Fe)

184-M. "Paraglyph" Printing for the Reproduction of Radiographs. (In French.) H. Granjon. *Soudure et Techniques Connexes,* v. 6, Jan.-Feb. 1952, p. 42-43.

Beginning with the original negative, a positive is made on film by contact. The proofs are then placed in contact with paper, superimposing on the printing-box the negative and the positive in slight misalignment. As a result, a relief effect is produced, equivalent to a photograph on which a radiograph is superimposed. (M23, S13)

185-M. Structure of Liquid Tin, Bismuth and Lead. (In Russian.) A. I. Donilova, V. I. Danilov, and E. Z. Spektor. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 1, 1952, p. 561-564.

X-ray studies were made. The arrangements of the atoms in the liquid and solid states are compared. Data are charted. (M26, Pb, Bi, Sn)

186-M. The Crystal Structure of Electrodeposited Silver. D. N. Layton. *Electrodepositors' Technical Society,* Advance Copy 9, 1952, 6 pages.

Literature review and results of experiments. Includes diagrams, diffraction patterns, and micrographs. 17 ref. (M26, L17, Ag)

187-M. The System Aluminum-Indium-Tin. A. N. Campbell, L. B. Buchanan, J. M. Kuzmak, and R. H. Tuxworth. *Journal of the American Chemical Society,* v. 74, Apr. 20, 1952, p. 1962-1966.

Includes the complete equilibrium diagram of the binary system Al-In. For the ternary system Al-In-Sn, isotherms were established for 750, 700, 650, and 450° C. using a constant-temperature furnace and sampling and analyzing congruent solutions. Tables and diagrams. (M24, Al, In, Sn)

188-M. The Uranium-Carbon System. M. W. Mallett, A. F. Gerds, and H. R. Nelson. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 197-204.

An investigation of the uranium-carbon system was made and a constitution diagram drawn on the basis of melting point, X-ray, and metallographic data. Three carbides of uranium were detected and identified: UC, U_2C_3, and UC_2. Photomicrographs. 17 ref. (M24, U, C-n)

189-M. The Constitution of the Aluminium-Chromium-Zinc Alloys at Low Chromium Contents. A. R. Harding and G. V. Raynor. *Journal of the Institute of Metals,* v. 80, Apr. 1952, p. 435-448.

The system Al-Cr-Zn was examined, by metallographic and X-ray methods, at low Cr contents. Experimental procedure and results of the investigation. Phase diagrams and charted data. 15 ref. (M24, Al, Cr, Zn)

190-M. The Aluminium-Rich Alloys of the System Aluminium-Chromium-Iron. J. N. Pratt and G. V. Raynor. *Journal of the Institute of Metals,* v. 80, Apr. 1952, p. 449-458.

The system Al-Cr-Fe was examined, in the Al-rich region, by metallographic and X-ray methods and by the chemical analysis of primary crystals extracted from slowly cooled alloys. Examination of the results shows that a strong analogy exists between the Al-rich alloys of this system and those of the system Al-Cr-Mn. The close analogies between the two structures are discussed in terms of the nature of the binary compounds. Phase diagrams and charted data. 15 ref. (M24, Al, Cr, Fe)

191-M. The Equilibrium Diagram of the System Copper-Gallium in the Region 30-100 At.-% Gallium. J. O. Betterton and William Hume-Rothery. *Journal of the Institute of Metals,* v. 80, Apr. 1952, p. 459-468.

Constitution of the Ga-rich alloys. According to previous work a phase δ, with a γ-brass structure, existed at low temperatures in the range 30-40 at. % Ga and at high temperatures underwent a transformation into a phase denoted γ, whose structure was not determined. The present work shows that this transformation is an order-disorder change, and that the high-temperature γ phase has a typical γ-brass structure. Graphs and phase diagrams. (M24, N10, Cu, Ga)

192-M. Chromium Carbide in Stainless Steel. A. B. Kinzel. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 469-488.

An extensive study of $Cr_{23}C_6$ formation in AISI Type 304 stainless steel. Specimens were treated for 100 hr. at 100° intervals from 1000 to 1500° F. and for 10 selected intervals from 5 min. to 64 hr. at 1300° F. Metallographic observations were made on form and distribution of the carbides. Numerous photomicrographs. (M26, SS, Cr, C-n)

193-M. Intermediate Phases in Ternary Alloy Systems of Transition Elements. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 522-523.

Discussion of paper by Sheldon Rideout, W. D. Manly, E. L. Kamen, B. S. Lement, and Paul A. Beck; item 285-M, 1951. (M24, AY)

194-M. Chromium-Nickel Phase Diagram. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 523-524.

Discussion of paper by David S. Bloom and Nicholas J. Grant; item 303-M, 1951. (M24, Cr, Ni)

195-M. Proposed Phase Designations for Titanium-Rich Alloys. Walter L. Finlay. *Modern Metals,* v. 8, Apr. 1952, p. 69-70, 72.

Proposes system which would be consistent among all Ti-rich alloys. (M26, Ti)

196-M. Further Observations of Growth Patterns on Silicon Carbide (Si-C) Crystals. Ajit Ram Verma. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 441-446.

Further observations of growth patterns on SiC crystal faces using techniques previously described. Conditions for the interaction of growth fronts issuing from a num-

ber of dislocations, and shapes of the loci of points of their intersection are calculated.
(M26, Si, C-n)

197-M. Factors Affecting the Solubility of Carbon in Iron. R. V. Riley. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A81-A96; disc., p. A96-A99.

Previously abstracted from *Institute of British Foundrymen*. See item 290-M, 1951.
(M24, N12, E10, CI)

198-M. The Use of Gold Leaf as a Reference Material in the Determination of Lattice Constants by Electron Diffraction. R. I. Garrod. *Proceedings of the Physical Society*, v. 65, sec. A., Apr. 1, 1952, p. 292-293.

Work applied to several types of samples. (M26)

199-M. The Crystal Parameters of Beryllium. E. A. Owen. *Proceedings of the Physical Society*, v. 65, sec. A., Apr. 1, 1952, p. 294-295.

Correlates and discusses various values reported in the literature.
(M26, Be)

200-M. Austenite in Low Carbon Iron. J. W. Menter, J. Nutting, and A. L. Tsou. *Proceedings of the Physical Society*, v. 65, sec. B., Apr. 1, 1952, p. 305-306.

Grain boundaries were examined by electron diffraction. Results.
(M27, Fe)

201-M. A Specimen-Treating Adaptor for the Electron Microscope. Nobuji Sasaki and Ryuzo Ueda. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 136-138.

A substance already placed on the specimen holder can be subjected to a certain physical or chemical treatment and then moved to the usual position of observation without exposing it to air, in the apparatus described. Includes photomicrographs of MoO_3 after phases of oxidation and reduction. (M21)

202-M. Microanalytical Problems in Metallography and Metallurgy. (In German.) W. Koch. *Angewandte Chemie*, v. 64, Apr. 7, 1952, p. 187-195.

Particular problems with reference to investigation of the structure of iron and steel. It has been possible to obtain new information concerning carbide and oxide inclusions, as well as those of nitrides, sulfides and intermetallic compounds. Particular attention is paid to problems of sampling. Micrographs, photographs, diffraction patterns, graphs, and diagrams. 16 ref. (M general, Fe, ST)

203-M. Electron Interferences and Their Application. (In German.) H. Raether. *Ergebnisse der exacten Naturwissenschaften*, v. 24, 1951, p. 54-141.

Electron sources and theory of electron interferences. Methods of applying them in study of mechanically worked and electropolished and electrodeposited surfaces. Diagrams, photographs, and electron micrographs. 188 ref. (M25, M21)

204-M. Investigation of Iron Amalgam for Grain Size and Ferro-Magnetism. (In German.) A. Mayer and E. Vogt. *Kolloid Zeitschrift*, v. 125, Mar. 1952, p. 174-175.

Brief discussion on colloidal solutions of Fe in Hg (amalgam).
(M27, P16, Fe, Hg)

205-M. The Miscibility Gap in the Liquid Phase of the Lead-Zinc-Silver System. (In German.) W. Seith and H. Johnen. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 140-143.

Thermal analysis was applied to investigation. Graphs.
(M24, Pb, Zn, Ag)

206-M. The Structure of Electrolytic Alloy Deposits. VII. Copper-Bismuth and Copper-Antimony Alloys. (In German.) Ernst Raub. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Apr. 1952, p. 153-160.

Deposition conditions; composition; hardness, microscopic, and X-ray analyses; structures of the deposits; and their relationships to constitution diagrams. Tables and graphs. 12 ref.
(M27, M24, L17, Cu, Bi, Sb)

207-M. Attempts at an Explanation of the Lanthanum-Sodium and the Lanthanum-Calcium Binary Systems. (In German.) Walter von Mässenhausen. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 53-54.

Experiments indicate that there is only a slight affinity between La and Na or Ca. Thermal analysis seems to indicate existence of eutectic state which, however, could not be established by microscopic investigations. (M24, La, Na, Ca)

208-M. Two-Dimensional Electron Interferences in Irradiated Metal Layers. (In German.) H. Raether. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 210.

Study of crystal lattices with electron interferences requires the use of monocrystals or monocrystal-like layers. Includes schematic representation of the transmission diagram of Au-Cu layers in different irradiation directions. (M26)

209-M. The Structure of Metallic Materials. (In German.) K. Wellinger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Mar. 1, 1952, p. 177-184.

A review. Types of structure examinations, relationship between structure and chemical composition, and structure and type of production. Micrographs, macrographs, and diagrams. (M27, M28)

210-M. New Experimental Data on Dislocations in Metals. (In Russian.) *Uspekhi Fizicheskikh Nauk*, v. 45, Sept. 1951, p. 154-158.

A review taken from current literature, both Russian and Western.
(M26)

211-M. Determination of the Orientation of Metallic Monocrystals. (In Russian.) N. B. Gornyi. *Zapiski Vsesoiuznogo Mineralogicheskogo Oshchestva*, ser. 2, v. 80, Oct.-Dec. 1951, p. 245-257.

A method using reflected light rays. Results are compared with Laue-grams. Data are tabulated.
(M23)

212-M. The Use of Isoactivity Lines in Ternary Phase Diagrams. (In Swedish.) Mats Hillert. *Jernkontorets Annaler*, v. 136, No. 2, 1952, p. 25-37.

In isothermal sections of ternary phase diagrams, compositions of constant activity for each component may be represented by contour curves, called isoactivity lines. A useful general property of such lines is formulated and the value of this property demonstrated in five applications. (M24)

213-M. Structure of Oxide Replicas for Electron Microscopy. Shigeto Yamaguchi. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 445-447.

Concludes that oxide films formed on metals, whose atom distances coincide with those of the substrata, can reproduce the substrate faces satisfactorily. Micrographs of oxide films on a single crystal of Fe and of an Fe-Ni alloy.
(M21, Fe, Ni)

214-M. The Separation of Cold-Work Distortion and Particle Size Broadening in X-Ray Patterns. B. E. Warren and B. L. Averbach. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 497.

Method based on crystallographic measurements. Graphs. (M22)

215-M. Quantitative Printing Methods for the Study of Segregation in Steel. Hugh O'Neill. *Metallurgia*, v. 45, Apr. 1952, p. 215-216.

An attempt to determine quantitatively the degree of sulfide segregation in a steel, by the photometry of transparent sulfur prints. The principle can be extended to phosphorus prints on cellophane. Mn and Cr printing should also be possible. Tables and graphs. (M28, ST)

216-M. Sigma Phase in High-Purity 18-10. Samuel J. Rosenberg and Carolyn R. Irish. *Metal Progress*, v. 61, May 1952, p. 92-93.

A study of phase boundaries of the Fe-Cr-Ni ternary diagram at 1200° F. in reference to conflicting published data. Phase diagrams and micrographs.
(M24, SS, Fe, Ni, Cr)

217-M. Fine Crystals at Polished Surface. Bruce Chalmers. *Metal Progress*, v. 61, May 1952, p. 94-95.

Further evidence that mechanical polishing leaves behind a surface which, in crystallographic nature, may be far different from the metal a small distance underneath. Laue photographs of silver single crystals. (M26, M21, Ag)

218-M. Microscope for High-Temperature Metallography. *Metal Progress*, v. 61, May 1952, p. 166, 168. (Condensed from "A Simple Reflecting Microscope for High-Temperature Metallography". D. W. Dewhirst and M. J. Olney.)

Previously abstracted from *Journal of the Iron and Steel Institute*. See item 14-M, 1952. (M21)

219-M. The Effects of Configuration Interaction on the Atomic Hyperfine Structure of Gallium. G. F. Koster. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 148-154.

Theoretical and mathematical study. Determination of quadrupole moments of Ga, and estimate of those for Al, In, and Cl. Tables. 17 ref. (M26, Ga, Al, In)

220-M. Some Preliminary Comments on the System Molybdenum-Aluminum. R. L. Wachtell. *Powder Metallurgy Bulletin*, v. 6, Apr. 1952, p. 99-104.

A tentative phase diagram and photomicrographs. Powder metallurgy was found satisfactory for the preparation of alloys containing less than about 70% Al. In view of the oxidation protection of Al-Mo alloy coatings, curves are included showing the performance in air of hot pressed bodies of several compositions at 1150° C.
(M24, H general, Mo, Al)

221-M. Micrographic Study of the Brittle and Tough States of Low-Alloy Carbon Steels. (In French.) P. A. Jacquet. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 195-207.

Use of a coating of cellulose acetate to clean the surface, which has been prepared by electropolishing followed by attack in an ether solution of picric acid. This improvement of the technique makes it possible to determine the structural differences between two states of the same piece of steel, obtained directly after tempering or by reversible heat treatment. Micrographs. 15 ref. (M21, AY)

222-M. Investigation of the Structure of Fused Inorganic Materials and Amorphous Substances. (In German.) J. E. Hiller. *Angewandte Chemie*, v. 64, Apr. 21, 1952, p. 209-212.

On the basis of experiments and calculations, the glasses are used as an example to show that there is also a loose form of arrangement in the amorphous stage; but that, in contrast with crystals, it lacks periodicity and thereby symmetry.

Differences in distance between particles and in coordination numbers between the crystalline and the amorphous states are shown for Se, Sb, As, molten metals, water, A, and N_2. 35 ref. (M26)

223-M. (Book) **Elements of Physical Metallurgy.** Albert G. Guy. 293 pages. 1951. Addison-Wesley Press, Inc., Cambridge 42, Mass. $6.50.

A textbook for courses in fundamentals of physical metallurgy. Atomic and crystal structure; equilibrium diagrams; structure of alloys; physical properties; elasticity and plasticity of metals; corrosion; diffusion; recovery, recrystallization, and grain growth; heat treatment of steel, and a survey of metallurgy.

(M general, N general, P general)

224-M. (Book) **The Interpretation of X-Ray Diffraction Photographs.** N. M. F. Henry, H. Lipson, and W. A. Wooster. 258 pages. 1951. MacMillan and Co., London; or D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y. $8.50.

Intended to help students and research workers to understand the theory and practice of the interpretation of X-ray diffraction photographs. The discussion is carried up to the subject of crystal-structure determination, but does not include more than passing reference to space groups and their recognition by means of X-ray diffraction. (M22)

225-M. (Book) **Le Microscope Electronique et ses Applications.** (The Electron Microscope and Its Applications.) T. Reis. 202 pages. 1951. Presses Universitaires de France, 108 Blvd. St. Germain, Paris.

Part I: Limits of vision and principles of the optics of the light; theoretical principles of electronic optics; parts of the electron microscope; commercially available types and future prospects. Part II: Preparation of specimens, and applications of the microscope in the fields of chemistry, metallurgy, and biology. (M21)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

135-N. Mechanism of the Influence of Preliminary Quenching on the Rate of Graphitization of Cast Iron. (In Russian.) K. P. Bunin and N. M. Danil'chenko. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 381-383.

The graphitization of white cast iron subjected to preliminary quenching and to isothermal treatment at 400° C. The large number of microscopic quenching cracks are considered as the sites for graphite nuclei, thus explaining the effect of preliminary quenching. (N8, CI)

136-N. A Study of the Nucleation and Growth Processes in the Synthesis of Colloidal Gold. John Turkevich, Peter Cooper Stevenson, and James Hillier. *Discussions of the Faraday Society*, No. 11, 1951, p. 55-75.

Includes graphs and electron micrographs. 31 ref. (N2, N3, Au)

137-N. Removal of Embrittling Gases From Zirconium. W. C. Lilliendahl. E. D. Gregory, and D. M. Wroughton. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 187-190.

A process for removal of dissolved O_2 from Zr by heating the solid metal in molten or gaseous Ca. Equilibrium O_2-Zr ratios were determined as a function of time and temperature of treating. N_2 is not removed in the treating cycle, and contamination of the treated metal with this impurity may occur. This may be prevented by careful control of treating temperatures. At high treating temperatures, the process may be used for removal of N_2 from Ca. (N1, Zr)

138-N. The Solid Solubilities of Cadmium, Indium, and Tin in Aluminium. H. K. Hardy. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 431-434.

The solid solubilities of Cd, In, and Sn in Al at 530° C. and above were estimated metallographically on electropolished specimens. 24 ref. (N12, Cd, In, Sn, Al)

139-N. Isothermal Mode of the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 489-500.

A study in a 71% Fe, 29% Ni alloy shows martensite formation takes place mainly by nucleation of new plates. Nucleation is activated by thermal fluctuations superimposed on localized regions of very high strain. The reaction-path concept offers a unified picture of the kinetics. Tables, graphs, and 17 ref. (N8, Fe)

140-N. Recrystallization of Aluminum Single Crystals After Plastic Extension. N. K. Chen and C. H. Mathewson. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 501-509.

Relationship to structure of the deformed matrix. Shapes of new grains are analyzed with regard to slip planes and to presence or absence of deformation bands. A mechanism by which orientations of recrystallized grains are related to parent lattice. Tables, graphs, photographs, stereographic projections, and 14 ref. (N5, Q24, Al)

141-N. Grain Structure of Aluminum-Killed, Low Carbon Steel Sheets. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 511-513.

Discussion of paper by R. L. Solter and C. W. Beattie; see item 243-N, 1951. (N3, M27, CN)

142-N. Theory of Grain Boundary Migration Rates. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 513-514.

Discussion of paper by David Turnbull, item 194-N, 1951. (N1, P12)

143-N. Secondary Recrystallization in Copper Wire. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 515.

Discussion of paper by Guido Bassi. See item 162-N, 1951. (N5, Cu)

144-N. Constitution and Precipitation-Hardening Properties of Copper-Rich Copper-Tin-Beryllium Alloys. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 516-517.

Discussion of paper by R. A. Cresswell and J. W. Cutherbertson; item 247-N, 1951. (N7, M24, Cu)

145-N. Burst Phenomenon in the Martensitic Transformation. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 519-520.

Discussion of paper by E. S. Machlin and Morris Cohen. See item 272-N, 1951. (N8, N12, Fe)

146-N. Isothermal Transformation and Properties of a Commercial Aluminum Bronze. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 520-522.

Discussion of paper by A. S. Kasberg, Jr. and David J. Mack; item 262-N, 1951. (N9, Q general, Cu)

147-N. Effects of Tungsten or Molybdenum Upon the Alpha-Beta Transformation and Gamma Precipitation in Cobalt-Chromium Alloys. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 524-526.

Discussion of paper by E. E. Fletcher and A. R. Elsea; item 261-N, 1951. (N6, N7, Co, Cr)

148-N. Abnormal Grain Growth in S-816 Alloy. A. I. Rush, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics*, Technical Note 2678, Apr. 1952, 30 pages.

Investigation to establish the fundamental causes of abnormal grain growth under conditions encountered during forging of blades for the gas turbine of jet engines. Abnormal grain growth was induced by temperature cycling alone. Water quenching of the bar stock from 2150 or 2300° F. rendered the samples susceptible to abnormal grain growth upon reheating to 2300° F. Air cooling was sufficient to induce grain growth during subsequent solution treatment for some of the prior treatments. Diagrams and micrographs. (N3, Co, SG-h)

149-N. Preparation of Grey Tin. *Nature*, v. 169, Apr. 12, 1952, p. 621-622.

Method for transformation of ordinary commercial types of tin to the gray allotropic modification. Pure Sn (99.99%) is deformed by cold work and allowed to recrystallize at a temperature below the $\alpha \rightleftharpoons \beta$ transformation temperature. For cooling, the tin may be packed in solid CO_2 during working. (N6, Sn)

150-N. Growth Spirals on Magnesium Crystals. A. J. Forty. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 481-483.

This is the first direct indication of the presence of screw dislocations in a simple metal crystal, though screw dislocations of large Burgers vector have been seen in chemically deposited gold. It is thought that the growth layers are either one or two atoms in thickness. (N12, Mg)

151-N. Growth Spirals of Silicon Carbide Crystals. (In French.) Adrienne R. Weill. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences*, v. 234, Mar. 3, 1952, p. 1068-1070.

Theory of helical crystal growth beginning with dislocations which emerge at right angles to a crystallographic face, with respect to the different scales on which this phenomenon is observed on SiC crystals examined under the microscope by reflection without any preparation of the surfaces. (N12, Si, C-n)

152-N. Research on the State of Orientation of the Gold-Copper Alloy $AuCu_3$ With the Aid of Electron Interferences. (In German.) H. Raether. *Zeitschrift für angewandte Physik*, v. 4, Feb. 1952, p. 53-59.

Experimental study of the order-disorder transformation of thin vapor-deposited $AuCu_3$ films below, at, and above the critical temperature. Results are evaluated. Includes electron micrographs and diagrams. 15 ref. (N10, M21, Au, Cu)

153-N. Concentration of Crystal Nuclei During Their Separation From Supersaturated Solid Solutions. (In German.) Erich Scheil. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 40-41.

Use of the Becker theory of separation of homogeneous solid solutions. Recommends further investigation of the growth process, in order to clarify W. Gerlach's observations on Au-rich, Au-Ni solid solutions. Graphs indicate dependence of precipitation upon concentration. (N12, Au)

154-N. A Crystal Growth Phenomenon in Antimony-Lead-Tin Alloys. (In German.) Karl Löhberg and Elisabeth Schulz. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 50-53.

Dependence of crystal structure of Sb-Pb-Sn and Sb-Tl-Sn alloys on Sn content. Effects of small amounts of S, Se, or Te were also determined. (N12, Sb, Pb, Sn, Tl)

155-N. The Shape of the Solidification Curve of High-Purity Aluminum Crystals and the Formation of Deformation Curves. (In German.) Kurt Lücke and Hansheinz Lange. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 55-66.

Shapes of the solidification curves of various metals were investigated during tensile stress. The process of solidification. Deformation bands, and the mechanism of their formation. Diagrams and micrographs, 44 ref. (N12, Q24, Al)

156-N. Structural Changes of Crystals by Bombardment With α-Particles. (In German.) Berthold Stech. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 175-185.

Debye-Scherrer diagrams indicate that bombarding certain types of crystals with large amounts of α-particles causes changes in their structures. Several examples. For instance, Se was converted from the amorphous to the most crystalline modification by this means. 28 ref. (N6, Se)

157-N. TTT-Diagrams for 7 and 9% Chromium Steels. Wm. L. Frankhouser and G. N. Emmanuel. *Metal Progress*, v. 61, May 1952, p. 74-79.

Experimental procedure and TTT-diagrams. Curves were constructed to represent the transformations involved. Micrographs. (N8, SS)

158-N. Isothermal Transformation of 9% Cr Steel. Wm. L. Frankhouser. *Metal Progress*, v. 61, May 1952, p. 96-B.

Data sheet giving TTT-diagram and photomicrographs. (N8, SS)

159-N. Recrystallization and Fabrication of Tungsten. *Metal Progress*, v. 61, May 1952, p. 172, 178. (Condensed from "Recrystallization of Tungsten". A. L. Simmons.)

Previously abstracted from *Metal Industry*. See item 37-N, 1952. (N5, J23, F22, W)

160-N. Study Formation of Zinc Crystals. *Metal Progress*, v. 61, May 1952, p. 180. (Condensed from "The Study of Recrystallization in Zinc by Direct Observation". G. Brinson and A. H. W. Moore.)

Previously abstracted from original *Journal of the Institute of Metals*. See item 205-N, 1951. (N5, M21, Zn)

161-N. Diffusion of Elements in Molten Iron. (In Russian.) B. V. Stark, E. V. Cheleshchev, and E. A. Kozachkov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Nov. 1951, p. 1689-1695.

An experimental study. Apparatus and method. Data are charted for diffusion of Mn and Si in Fe. (N1, Fe)

162-N. Discussion on Problems of the Theory of Phase Transformations in Steels and Alloys Concerning the Basic Ideas of the Theory of Phase Transformations in Solids. (In Russian.) V. I. Arkharov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Nov. 1951, p. 1744-1751. (N general)

163-N. (Book) Diffusion in Solids, Liquids, Gases. W. Jost. 558 pages. 1952. Academic Press Inc., 125 E. 23rd St., New York 10, N. Y.

Chief aim is to assist in planning, evaluating, and understanding diffusion experiments, at the same time giving a survey of the results obtained to date. Disorder in crystals; electrolytic conduction and diffusion in ionic crystals; diffusion in metals and non-polar crystals; diffusion and solubility in solids; mobility of ions in solid and molten metals and alloys; surface reactions of metals, formation of protective layers and related reactions; diffusion in gases and liquids; and thermal diffusion. (N1)

164-N. (Book) Isothermal Transformation Diagrams for Nickel Steel. 57 pages. 1951. The Mond Nickel Co., Ltd., Curzon St., London, W. 1, England.

The construction, general features, and limitations of isothermal transformation diagrams. The effect of various elements on the transformation, the influence of structure on mechanical properties, and special heat treatments based on these diagrams. Facing each of the 13 diagrams is a page of tabular data concerning the particular Ni steel represented. (N8, Q general, J26, AY)

P

PHYSICAL PROPERTIES AND TEST METHODS

248-P. Photoconductivity in Vacuum Coated Selenium Films. Paul H. Keck. *Journal of the Optical Society of America*, v. 42, Apr. 1952, p. 221-225.

Results of an investigation. Graphs and tables. (P17, L25, Se)

249-P. The Dissolution of Metals Over the Temperature Range of 25 to −60°. II. The Dissolution of Cadmium in Hydrochloric Acid-Methyl Alcohol-Water Solutions. A. B. Garrett and J. R. Heiks. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 449-451.

Data were obtained under static and dynamic conditions, in the presence and absence of a depolarizer over the temperature range of 25 to −60° C. Energy of activation of the static depolarized process is in the order of 4000 cal. per mole and of the nondepolarized process is about 10,000 cal. per mole. The nondepolarized dissolution process is first order with respect to the acid concentration. Graphs and tables. (P13, Cd)

250-P. Dual Adsorption of Polar Organic Compounds on Steel. Norman Hackerman and E. L. Cook. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 524-526.

Study on the degree of specificity of adsorption of steel powder toward various functional groups. Graphical data. (P13, ST)

251-P. Solid Surface Energy and Calorimetric Determinations of Surface-Energy Relationships for Some Common Minerals. A. Kenneth Schellinger. *Mining Engineering*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 369-374.

Methods used to determine surface energies on solids. New data on surface-energy relationships for quartz, glass sand, crystalline NaCl, specimen-grade pyrite, and specimen-grade calcite. Obtained by a technique combining calorimetric determination of energy and BET surface area measurement. Tables, graphs, apparatus diagrams. 19 ref. (P10)

252-P. Phase Transitions in Adsorbed Films. Lothar Meyer and Earl Long. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1035-1037.

A thermodynamic treatment of first and second-order transitions in adsorbed layers. The results are compared with the experimental evidence for the melting of argon and the transition HeI-HeII in adsorbed layers. (P12)

253-P. Radiations of Rh^{99}, Rh^{101}, Rh^{105}, and Ru^{105}. C. L. Scoville, S. C. Fultz, and M. L. Pool. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1046.

Ruthenium metal of high purity was bombarded with 6.3-Mev protons and 10-Mev deuterons and the spectra of the activities obtained were examined in a 180° beta-ray spectrometer. The spectrometer sources consisted of the activated metal spread out evenly on thin Zapon foil ribbons. The source and backing had a thickness of about 15 mg. per sq. cm. (P13, Rh)

254-P. Energy Absorption During Twin Formation in Zinc Single Crystals. E. I. Salkovitz. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1046-1047.

Measured by means of ballistic pendulums in measuring the energy absorbed during kink formation in Zn and Cd. (P12, Zn)

255-P. The Scattering of 9.6-Mev Protons by Carbon, Aluminum, and Magnesium. C. J. Baker, J. N. Dodd, and D. H. Simmons. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1051-1052.

A remotely controlled scattering chamber was used to investigate the scattering of 9.6-Mev protons by some light nuclei. The source of protons was the extracted beam of the Birmingham 60-in. cyclotron. The scattered particles were detected by a counter telescope consisting of three proportional counters which fed a flexible coincidence or anticoincidence circuit. (P13, Al, Mg)

256-P. Some Magnetic Properties of Metals. I. General Introduction, and Properties of Large Systems of Electrons. II. The Influence of Collisions on the Magnetic Behaviour of Large Systems. R. B. Dingle. *Proceedings of the Royal Society*, v. 211 ser. A, Mar. 20, 1952, p. 500-525.

Detailed mathematical, theoretical treatment. Part I includes a survey of problems to be covered in papers to be published later. 42 ref. (P16)

257-P. The Theory of Single-Domain Particles. (In Russian.) E. Kondorskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 365-368.

A theoretical discussion of single-domain, ferromagnetic particles. (P16)

258-P. Variation of Electrical Resistance of an Fe_3Pt Alloy in Linear Magnetic Fields. (In Russian.) R. G. Annaev, V. G. Dubrovskii, and E. K. Kapustian. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 549-552.

The electromagnetic properties of

an Fe_3Pt alloy wire were studied over a range of magnetic fields and annealing temperatures (effect of ordering). Data are charted. 10 ref. (P15, P16, Fe, Pt)

259-P. Determination of Surface Tension of Materials at Their Melting Points. (In Russian.) V. I. Smirnova and B. F. Ormont. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 11, 1952, p. 751-753.

Method for determination. Equations used to calculate values. Experimental data are tabulated for Fe, Ni, Cu, Au, Ag, Sn, and Bi. (P10)

260-P. Thermomagnetic Effect in Fe-Pt Alloy. (In Russian.) R. G. Annaev and M. V. Kolodin. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 11, 1952, p. 697-700.

The effect of ordering (annealing temperature) and strength of the magnetic field. Data are charted. 10 ref. (P16, Fe, Pt)

261-P. Investigation of the Temperature Dependence of the Hall Effect in Electrolytic Iron. (In Russian.) V. V. Parfenov and V. R. Abel's. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 21, 1952, p. 877-879.

Data charted. (P15, Fe)

262-P. Thermal and Thermoelectric Properties of Ferromagnetic Metals. A. I. Rezanov. *Doklady Akademii Nauk SSSR,* v. 82, Feb. 21, 1952, p. 885-887.

A theoretical, mathematical analysis. (P16, SG-n, p)

263-P. Permanent Magnets From Ultrafine Iron Powder. Bernard Kopelman. *Electrical Engineering,* v. 71, May 1952, p. 447-451.

Theory and properties. Magnets compare favorably with Alnico magnets. Diagrams and graphs. 10 ref. (P16, H general, Fe, SG-n)

264-P. The Heat of Solution of Neptunium Metal and the Heats of Formation of Some Neptunium Chlorides. A Microcalorimeter for Heat of Solution Measurements. Edgar F. Westrum, Jr., and LeRoy Eyring. *Journal of the American Chemical Society,* v. 74, Apr. 20, 1952, p. 2045-2047.

Values determined. A convenient precise calorimeter suitable for determination of heats of relatively rapid reactions for milligram quantities of materials, and its performance. Apparatus diagram and tables. 13 ref. (P12, Np)

265-P. Recovery of the Resistivity of Metals After Cold-Working. *Nature,* v. 169, Apr. 12, 1952, p. 623.

Measurements on the recovery of the electrical properties of Au, Ag, and Cu wires. Graph shows results. (P15, Cu, Ag, Au)

266-P. Study of the Distribution of Surface Potential by Means of Radioactive Deposits. T. Westermark and L. G. Erwall. *Nature,* v. 169, Apr. 26, 1952, p. 703-704.

Experiments on the contact potentials of polished metallic surfaces. A special camera of cylindrical form was constructed containing a radiothorium source. A uniform electric field can be maintined in the space between the source and a collecting disk. After exposure, the disk is removed and an autoradiograph prepared. The method has so far been applied only to a few alloys; but it is believed to be of rather general applicability provided the contact potential differences are not too small. (P15)

267-P. Experiments on the Electrical Resistivity of Metals. D. K. C. MacDonald. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 479-481.

It has been found possible to adapt a Collins helium liquefier so that electrical conductivity measurements may be carried out continuously from room temperature down to the liquid He temperature range in a single experiment with satisfactory accuracy. Some measurements on Rb. (P15, Rb)

268-P. Neutron Transmission Cross Sections in the Kilovolt Region. Carl T. Hibdon, Alexander Langsdorf, Jr., and Robert E. Holland. *Physical Review,* ser. 2, v. 85, Feb. 15, 1952, p. 595-600.

Neutron transmission cross sections were measured with about 2 kev. resolution in the range 2-25 kev., and to high energies in some cases. Measurements at the lower energies were made possible by a collimator and shield around the counters, which reduced background, and by the high efficiency obtained by many counters embedded in an array in a paraffin moderator. Resonances were observed in Na, Ti, V, Mn, Fe, Co, and Ni. (P10, Na, Ti, V, Mn, Fe, Co, Ni)

269-P. Nuclear Elastic Scattering of High Energy Protons. R. E. Richardson, W. P. Ball, C. E. Leith, Jr., and B. J. Moyer. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 29-41.

Differential elastic scattering cross sections of C, Mg, Al, Si, S, Cu, Ag, Ta, W, Pb, and Bi for 340-Mev protons. Apparatus diagrams and graphs. 17 ref. (P10)

270-P. Domain Patterns on FeSi Crystals. C. E. Ying, S. Levy, and R. Truell. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 133-134.

Several interesting patterns found in a study of effect of magnetic history. Crystals contained 3.8% Si. Photomicrographs. (P16, Fe)

271-P. The Inelastic Scattering of Fast Neutrons From Iron. P. H. Stelson and W. M. Preston. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 132-133.

A method for separating low-lying energy levels in intermediate weight nuclei. Apparatus diagram and graph. (P10, Fe)

272-P. Behavior of the Heat Capacity of Superconducting Niobium Below 4.5° K. A. Brown, M. W. Zemansky, and H. A. Boorse. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 134-135.

Direct measurements of above property from 2.5 to 20° K. in both normal and superconducting phases. Graphs. (P15, Cb)

273-P. The Inelastic Scattering of Very Slow Neutrons by Iron. R. Latham and J. M. Cassels. *Proceedings of the Physical Society,* v. 65, sec. A, Apr. 1, 1952, p. 241-245.

The increase with temperature of the total cross section of iron for very slow neutrons was measured with the help of a cyclotron and a neutron velocity selector. 12 ref. (P10, Fe)

274-P. Some Magnetic Properties of Metals. III. Diamagnetic Resonance. IV. Properties of Small Systems of Electrons. R. B. Dingle. *Proceedings of the Royal Society,* ser. A, v. 212, Apr. 8, 1952, p. 38-65.

Electromagnetic radiation incident on a large system of electrons moving in a constant magnetic field H in a metal is strongly absorbed near a frequency represented by a given equation. Part IV: Calculation of the magnetic properties of a system of electrons contained within a cylinder of very small radius with its axis parallel to the field direction. The influence of electron spin on both steady and periodic terms. (P16)

275-P. Range-Energy Relations for Electrons and the Determination of Beta-Ray End-Point Energies by Absorption. L. Katz and A. S. Penfold. *Reviews of Modern Physics,* v. 24, Jan. 1952, p. 28-44.

Methods commonly used to determine the ranges of beta rays from absorption curves. A new method developed by the authors. Includes data for β-ray transmission and absorption by various thicknesses of Al. 61 ref. (P10, Al)

276-P. Physical Effects of High Pressure. P. W. Bridgman. *Times Review of the Progress of Science,* Spring 1952, p. 1-4.

Apparatus and techniques, and effects on compression of fluids and solids, freezing, polymorphic forms, atomic structure, fracture of steel, etc. (P general, Q general, M25, ST)

277-P. Slow Neutron Transmission of Thorium. W. W. Havens, Jr., and L. J. Rainwater. *U. S. Atomic Energy Commission,* AECD-3288, Apr. 17, 1951, 6 pages.

Results of investigation in various regions. (P10, Th)

278-P. Electrical Properties of Very Thin Silver, Aluminum, and Silicon Films. (In French.) André Blanc-Lapierre, Marcel Perrot, and Jean-Pierre David. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 10, 1952, p. 1133-1135.

Conductivity, at ordinary temperature, of thin pieces of Ag, Al, and Si, obtained by evaporation in a vacuum. Graphs and table. (P15, Ag, Al, Si)

279-P. Study of Thin Strips of Mumetal Subjected to Weak Alternating Fields as a Function of Temperature. (In French.) Claude Abgrall and Israel Epelboin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 17, 1952, p. 1265-1267.

Calculation of the Foucault current applied to a homogeneous permanent magnet does not agree with that observed experimentally. This anomalous relationship between resistivity measured directly and that deduced by calculation was studied for mumetal containing Mo and annealed at 1100° C. (P15, P16, Ni)

280-P. Electrochemical Studies by the Radioactive-Tracer Method. (Electrolyses in Extremely Dilute Solutions.) (In French.) M. Haissinsky. *Experientia,* v. 8, Apr. 15, 1952, p. 125-132.

The ordinary methods of determining electrochemical potentials cease to be applicable in extreme dilution. Energy conditions for formation of very thin electrodeposits (less than a monoatomic layer) can then be explored by means of radioactive indicators, following particular polarization curves. Relationship between critical potential defined by such curves and theoretical potential computed from the Nernst equation for the given concentration. Experimental results are collected for critical potentials of deposition of Po, Bi, Pb, Ag, etc., from extremely dilute solutions onto various metals. Shows that the heterogeneity of the electrode surface plays a considerable role in these electrolyses. 74 ref. (P15)

281-P. Electrode Phenomena During Electrolysis. (In French.) E. Darmois. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, Feb. 1952, p. C151-C153.

Formation of a layer of adsorbed ions at the electrode. Graphs show properties of various positive and negative ions. (P15)

282-P. Temperature Effects of Bismuth. (In German.) Hans Meissner. *Zeitschrift für angewandte Physik,* v. 4, Feb. 1952, p. 59-60.

Effect of temperature and time of annealing on the electrical resistance of Bi wire. Data are graphed. (P15, J23, Bi)

283-P. Methods of Measuring Polarization Potentials by Means of Model Experiments. (In German.) R. Piontelli, G. Bianchi, and R. Aletti. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Feb. 1952, p. 86-93.

Effect of environmental conditions on results. Results for typical metallic ions are shown graphically and diagrammatically. 10 ref. (P15)

284-P. Theory on the Electrical Conductivity of Metals. I. (In German.) H. Koppe. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 156-161.

Continuation of a previous article. New definition of surface distribution and method of computing the diffusion constant, showing that a scalar diffusion constant can be obtained under certain simplified assumptions. Computation is based on numerous approximations, such as free electrons, low current strengths, and diffusion approximation. (P15)

285-P. Results of Low Temperature Research. IX. Atomic Heat of Cobalt Between 15 and 270° K. (In German.) Klaus Clusius and Liselotte Schachinger. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 185-191.

Experimentally investigated in order to study further the great effect of electrons on the specific heat of ferromagnetic metals. Tables and graphs. 13 ref. (P12, Co)

286-P. Perturbing-Center and Inherent Semiconduction of Intermetallic Compounds. (In German.) E. Justi and G. Lautz. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 191-200.

Effect of structure on the very high maxima of electrical resistance of Cd-Sb alloys. Purest stoichiometric CdSb was found to be a true semiconductor because the Brillouin zones are fully occupied by electrons. Study deals also with room-temperature resistance of perturbing-center semiconductors formed by adding other metals to CdSb. Special properties. Diagrams and graphs. 19 ref. (P15, Cd, Sb)

287-P. Superconductivity and Resistance of Tin With Lattice Distortions. (In German.) W. Buckel and R. Hilsch. *Zeitschrift für Physik,* v. 131, no. 3, 1952, p. 420-442.

Experiments on vapor-deposited layers of Su show a close correlation between superconductivity and lattice distortion. Diagrams, graphs, and tables. 15 ref. (P15, M26, Sn)

288-P. The Mechanism of Sulfur Pickup of Iron, Nickel, and Nickel Alloys at Elevated Temperatures. (In German.) K. Hauffe and A. Rahmel. *Zeitschrift für physikalische Chemie,* v. 199, Jan. 1952, p. 152-169.

Experiments made to determine rate as a function of temperature and pressure. Diagrams and graphs. 43 ref. (P12, N1, Fe, Ni)

289-P. Kinetics of Dissolution of Aluminum in Sodium Hydroxide. (In Italian.) G. P. Bolognesi. *Alluminio,* v. 21, Jan. 1952, p. 27-41.

Studied by measurement of H_2 generated, for 99.5 and 99.99% Al, in different concentrations of NaOH, and in presence and absence of Hg. Solution potentials as a function of Hg content were also determined. Tables and graphs. 41 ref. (P13, P15, Al)

290-P. The Magnetic Properties of Pyrrhotine (Magnetic Pyrite.) (In Russian.) S. V. Lipin. *Zapiski Vsesoiuznogo Mineralogicheskogo Oshchestva,* ser. 2, v. 80, Oct.-Dec. 1951, p. 258-268.

Influence of the ratio of S to Fe and of the degree of homogeneity in this iron ore. (P16, B14, Fe)

291-P. Influence of Cold-Work on the Hall Effect of a Metal. Bernard Wiener and Gerhart Groetzinger. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 441-444.

A study on Cu to better understand the mechanism of cold work. Measurements made also on change of conductivity. Circuit diagram and tables. (P15, Q23, Cu)

292-P. The Isotope Effect in Superconductivity. II. Tin and Lead. B. Serin, C. A. Reynolds, and C. Lohman. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 162-164.

Critical magnetic fields were measured as a function of temperature. For tin, critical temperature is related to average mass number and critical magnetic fields are proportional to critical temperatures. The isotope effect is shown to be present in Pb. (P15, Sn, Pb)

293-P. Superconductivity of the Isotopes of Tin. E. Maxwell. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 235-242.

Superconducting transition temperatures of six samples of Sn with masses ranging from 113.58 to 123.01 were measured by a magnetic method. Critical field curves were determined between 1.4 and 3.8° K. Apparatus, graphs and tables. 27 ref. (P15, Sn)

294-P. New Technique for the Determination of Photonuclear Cross Sections. Lester L. Newkirk. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 249-251.

Method applied to Cu and C. Induced radioactivity is employed to monitor the synchrotron beam. Graphs. (P10, Cu, C)

295-P. Isotropic Artificial Dielectric. R. W. Corkum. *Proceedings of the I.R.E.,* v. 40, May 1952, p. 574-587.

Isotropic artificial dielectric media composed of a 3-dimensional cubic array of metal or dielectric spheres were investigated. Theoretical expressions using the Clausius-Mossotti relation were derived for the index of refraction, dielectric constant, and magnetic permeability. Samples using steel and fused-quartz spheres were fabricated, and the dielectric properties measured in a rectangular wave-guide. (P15, ST)

296-P. Multi-Oscillator Processes in the Scattering of Neutrons by Crystals. G. L. Squires. *Proceedings of the Royal Society,* v. 212, ser. A, Apr. 22, 1952, p. 192-206.

A neutron velocity selector was used to investigate variation of scattering of slow neutrons with temperature of the scatterer. Results were obtained for Ni and Mg and compared with Weinstock's theory. Graphs. 12 ref. (P10, Ni, Mg)

297-P. Thermomagnetic Study of Metallic Praseodymium. (In French.) Charlotte Henry la Blanchetais. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 24, 1952, p. 1353-1354.

Within a very wide temperature range, metallic Pr follows the Curie-Weiss law. It has a moment very close to that of Pr^{+++} ion, and behaves, from this point of view, like Ce or Nd. Includes graph. (P16, Pr)

298-P. Some Electrical Properties of Industrial Colloidal Silver. (In French.) R. Bedos. *Journal de Chimie physique et de Physico-Chimie biologique,* v. 49, Mar. 1952, p. 93-98.

The behavior of a sol of silver subjected to an alternating field of variable frequency was studied by determining the variation of the complex impedence of a measuring cell containing the Ag sol. Charts and diagrams. (P15, Ag)

299-P. Experimental Study of Ferromagnetic Domains. (In French.) L. F. Bates. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 185-194.

Study of "Bitter figures" — obtained by use of a colloidal powder placed on the surface of ferromagnetic metallic crystals. The surface is prepared by an electropolishing procedure. Apparatus is diagramed. Typical Bitter figures are explained for Si iron and for Co. Effect of inclusions. 14 ref. (P16, Fe, Co)

300-P. (Book) **Thermodynamics of Alloys.** John Lumsden. 384 pages. 1951. Institute of Metals, 4 Grosvenor Gardens, London S.W. 1, England.

Application of thermodynamics to the quantitative study of phase equilibria in metals and alloys. Emphasis is laid on the usefulness of thermodynamics for the accurate correlation of various equilibrium properties. The fundamental theory of the subject and some illustrative calculations on actual metals and alloys. Interpretation of thermodynamic parameters in terms of statistical mechanics. (P12, M24)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

406-Q. Methods for the Improvement of Drill-Collar Joints Evaluated by Full-Size Fatigue Tests. L. E. Thrishman. *Drilling,* v. 13, Apr. 1952, p. 99-100, 102; disc. p. 103.

Possible methods of improvement, applicable to almost any joint design. Full-size fatigue tests show what these methods will contribute in the way of increased resistance to fatigue failure of drill-collar joints. Graphs and diagrams. (Q7, ST)

407-Q. Effect of Individual Factors in Microhardness Tests. E. M. Shvetsova and T. V. Lebedeva. *Industrial Diamond Review,* v. 12, Mar. 1952, p. 50-52.

A study of the factors of inaccuracies in working the microhardness tester, peculiarities of single crystals, effect of varying strength of grains, nonuniformity in structure of metal, and change generally in test pieces at surface or otherwise. (Q29, Ni, Al, Mg, Cu)

408-Q. Impact Strength of 4140 v. TS 4140 Reported. *Iron Age,* v. 169, Apr. 24, 1952, p. 148.

Results in graphical form; conditions. (Q6, AY, TS)

409-Q. Production Problems. XIV. Hard and Soft Blake Hooks. *Iron and Steel,* v. 25, Apr. 1952, p. 129-130.

Due to variation in the hardness of fully processed Blake hooks after heat treatment, a general hardness survey was made on selected hooks. Hardness test results. (Q29, AY)

410-Q. A Cause of Brittleness in Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 24, Mar. 29, 1952, p. 99-100.

Deals with the sigma phase in reference to ductility of Fe-Cr or Fe-Cr-Ni alloys at high temperatures. (Q23, SS)

411-Q. Some Observations on the Determination of Residual Stresses in Cylindrical Metal Bodies by Sach's Boring Method. R. A. Dodd. *Metallurgia,* v. 45, Mar. 1952, p. 109-114.

A critical, general discussion and proposal of an experimental technique. Data concerning strains introduced by machining process; use of strain gages; and comparison with X-ray measurements. Tables, graphs, and photographs. (Q24)

412-Q. The Determination of Local Wear by the Use of Disappearing Marks. *Metallurgia,* v. 45, Mar. 1952, p. 151-153.

Various methods which utilize measurements on a depression made in a surface. Includes a Russian-reported "cut lune" method. Photomicrographs. (Q9)

413-Q. Effect of Surface Films on the Twinning of Metal Crystals. Ronald King. *Nature,* v. 169, Mar. 29, 1952, p. 543-544.

Electrodeposited layer of Cu raises the stress necessary to cause twinning in single crystals of Zn. Long single crystals, 1 mm. in diameter were grown and cut into several lengths which were given different surface treatments. The specimens were then tested in tension in a rigid frame apparatus in which the strain was brought about by means of a micrometer screw movement. A Polanyi beam was used for measuring the stress with a high degree of sensitivity. Stress-strain curves were obtained, and the onset of twinning, being accompanied by a sudden drop in stress, was readily detected. (Q24, Cu, Zn)

414-Q. Elastic and Plastic Properties of Very Small Metal Specimens. Conyers Herring and J. K. Galt. *Physical Review,* Ser. 2, v. 85, Mar. 15, 1952, p. 1060-1061.

Investigated by performing experiments on the thin whiskers which grow out from the surfaces of a number of low-melting-point metals. Observations were made on some Sn whiskers grown from a Sn-plated surface. (Q21, Q23, Sn)

415-Q. Fatigue Tests Under Axial Loads of Joints Bonded With Resinous Adhesive. W. N. Findlay, B. A. Century, and C. P. Hendrickson. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 353-357.

Previously abstracted from *ASTM Bulletin.* See item 299-Q, 1952. (Q7, Al)

416-Q. Welded Reinforcement of Openings in Structural Steel Members. D. Vasarhelyi and R. A. Hechtman. *Welding Journal,* v. 31, Apr. 1952, p. 169s-180s; disc. 180s-183s.

Tests were made to determine the unit strain energy and the true stress distribution in the plastic range of the material in a flat plate with a centrally located opening, which was square with rounded corners. Two such plates made from plain carbon semi-killed structural steel were tested in tension, one at room temperature and the other at −20° F. The first failed with a complete shear fracture and the other with a fracture almost entirely cleavage. The octahedral theory was used to determine the unit strain energy distribution, while the true stresses were computed by a method developed in the course of the investigation. (Q27, CN)

417-Q. Fatigue Tests on Aluminum Alloy Spot-Welded Joints. Marshall Holt and E. C. Hartmann. *Welding Journal,* v. 31, Apr. 1952, p. 183s-187s.

A comparison of results of fatigue tests of spot welded joints in sheets of various high-strength Al alloys. 10 ref. (Q7, K3, Al)

418-Q. Fracture Initiation and Propagation in Welded Ship Steels. P. J. Rieppel and C. B. Voldrich. *Welding Journal,* v. 31, Apr. 1952, p. 188s-198s; disc. p. 198s-201s.

The initiation and propagation of fractures in welded and prime-plate Kinzel-type transversely notched bead-bend specimens were investigated. Results suggest that the data from many welded test specimens be re-examined. It seems likely that poor performance, which has been believed to be caused by heat-affected zones, may in reality be directly related to weld-metal performance. (Q26, K general, CN)

419-Q. Upper and Lower Transitions in Charpy Tests. Discussion. R. W. Vanderbeck and W. P. Roop. *Welding Journal,* v. 31, Apr. 1952, p. 201s-204s.

Discussion of paper by W. J. Harris, Jr., J. A. Rinebolt and R. Raring published in Sept. 1951 issue (item 665-Q, 1951). (Q6, CN)

420-Q. Residual Stress and the Yield Strength of Steel Beams. Ching Huan Yang, Lynn S. Beedle, and Bruce G. Johnston. *Welding Journal,* v. 31, Apr. 1952, p. 205s-229s.

Analytical and experimental study of the elastic and plastic behavior of welded continuous steel beams. Stress concentration, residual stresses and other factors which affect the yield strength of steel members. Basic assumptions of the simple plastic theory are compared with the test results. Influence of residual stress on buckling strength of columns. 22 ref. (Q23, Q25, ST)

421-Q. The Micro-Mechanism of Fracture in the Tension Impact Test. Discussion. Glenn W. Geil. *Welding Journal,* v. 31, Apr. 1952, p. 230s-231s.

Discussion of paper by Walter H. Bruckner, published in Sept. 1951 issue (item 669-Q, 1951). (Q27, CN)

422-Q. Statistical Study of the Correlation Between the Composition of an Ordinary Cast Iron and Its Mechanical Properties. (In French.) Jorgen Drachmann. *Fonderie,* Jan. 1952, p. 2755-2762.

The relationships between chemical composition, machinability, Brinell hardness, and the depth of hardening of an ordinary cast iron were investigated. Data are charted. (Q general, S12, CI)

423-Q. Influence of the Dispersion (Microstructure) of a Metal on Its Plastic Flow in Active Media. (In Russian.) T. A. Amfiteatrova and B. Ia. Iampol'skii. *Doklady Akademii Nauk SSSR,* v. 82, Feb. 11, 1952, p. 735-738.

The influence of surface-active materials on the creep of polycrystalline Cu and Al was investigated using a special apparatus, in contact with kerosine; butyl hexyl, octyl, and cetyl alcohol, oleic acid, and dioctyl sulfosuccinate were investigated. Data are tabulated and charted; apparatus is diagrammed. (Q3, P10, M27, Cu, Al)

424-Q. Effects of Cerium on Graphite Formation in Alloy Cast Iron. Edward A. Rowe and Howard A. Johnson. *American Foundrymen's Society,* Preprint 52-1, 1952, 5 pages.

Concerned with the effect of Ce on an alloy cast iron containing Ni, Mn, and Mo. Changes in graphite structure, tensile strength, and hardness caused by the Ce additions. Addition of a secondary graphitizing inoculant with the Ce. Micrographs and tables. (Q23, Q29, M27, CI)

425-Q. A Test for Hot Tearing Tendency. E. A. Lange and R. W. Heine. *American Foundrymen's Society,* Preprint 52-14, 1952, 14 pages.

Test apparatus and procedure. Results with white cast irons. Graphs, diagrams, tables, and illustrations. (Q26, CI)

426-Q. Zinc in Aluminum Casting Alloys. Donald L. Colwell. *American Foundrymen's Society,* Preprint 52-38, 1952, 8 pages.

In nominal quantities in excess of most current specifications, Zn has a beneficial effect on mechanical properties and machinability and no adverse effects on castability or corrosion resistance. Emphasis is on the common Cu-Si casting alloys, both in the as-cast and heat treated conditions. The danger in Mg as an impurity, particularly in alloy CS64C, and also the neutral effects of Zn on alloy S5C. (Q general, G17, R general, Al, Zn)

427-Q. Metallurgy and Mechanics of Hot Tearing. H. F. Bishop, C. G. Ackerlind, and W. S. Pellini. *American Foundrymen's Society,* Preprint 52-65, 1952, 14 pages.

Solidification conditions during hot tearing of steel castings were determined by simultaneous radiography and thermal analysis. Corollary strength tests coupled with thermal analysis showed that development of high strength followed immediately upon elimination of film regions. Variables such as C, P, S and pouring temperature were investigated. A new generalized theory is presented. 16 ref. (Q23, E25, CI)

428-Q. Influence of Aluminum on Properties of Cast Gun Metal and Removal of Aluminum by Slag. Ake V. Larsson. *American Foundrymen's Society,* Preprint 52-70, 1952, 8 pages.

Influence of Al on the strength and pressure tightness of 83-6-5-6 gunmetal. Different refining agents were tested for removal of Al from brass and gunmetal melts. Practical recommendations. Tables and graphs. (Q23, E25, Cu)

429-Q. Experimental Study of Sliding Friction. Charles A. Maney. *American Journal of Physics,* v. 20, Apr. 1952, p. 203-210.

Coefficient of sliding friction is not a constant but varies with several factors. Pb, Al, steel, brass, and some nonmetals were studied. Tables and graphs. (Q9, Pb, Al, ST, Cu)

430-Q. Determination of Principal Plastic Strains. W. E. Cooper. *American Society of Mechanical Engineers,* Paper 51-A-128, 1951, 10 pages.

Techniques whereby the grid method of plastic-strain determination may be extended to include determination of strain at a point, rather than over a finite gage length; and determination of principal strain, magnitude and direction, when these directions are not necessarily in alignment with the original grid. Measurement may be made in terms of either the tensor or logarithmic definitions of finite strain. (Q27)

431-Q. A Criterion for the Failure of Cast Iron. John C. Fisher. *ASTM Bulletin,* Apr. 1952, p. 74-75.

Experimental results to substantiate the theory that failure of cast iron is governed by the laws of plastic deformation. (Q23, CI)

432-Q. Creep of Metals. *Automobile Engineer,* v. 42, Apr. 1952, p. 154-156.

Application of creep data to design problems. Graphical data on carbon steel. (Q3, CN)

433-Q. Summarized Proceedings of a Conference on Stress Analysis Liverpool, 1951. *British Journal of Applied Physics,* v. 3, Apr. 1952, p. 105-114.

Nine papers, dealing with numerical methods, electric resistance strain-gage methods, developments in France, fatigue, and photoelastic work are summarized. 11 ref. (Q25)

434-Q. Elevated-Temperature Fatigue-Testing Machine for Ceramic

Materials. J. Dick and L. S. Williams. *Engineering*, v. 173, Apr. 4, 1952, p. 422-423.

Machine developed in the course of an investigation of the mechanical fatigue endurance and delayed fracture properties of simple ceramics and alumina-base "cermets" (composite metal-ceramic bodies) at ordinary temperatures and elevated temperatures. (Q7)

435-Q. Survey of the Study of Hardness. J. A. Kohn. *Industrial Diamond Review*, new ser., v. 12, Apr. 1952, Supplement, p. 1-16.

Reviews various methods for determining hardness of minerals. 3-page bibliography. (Q29)

436-Q. Effects of Working on the Properties of Molybdenum. E. S. Byron and R. F. Baker. *Journal of the Electrochemical Society*, v. 99, May 1952, v. 194-196.

Solid ingots of Mo were prepared by powder metallurgy. Two wedges were machined. These were rolled to ⅜ in. thickness at 1200° C. in a single pass. One wedge was air cooled after rolling and the other was annealed for 1 hr. at 950° C. Degree of height reduction, hardness measurements, and tensile tests of properties transverse to rolling direction.
(Q general, H general, Mo)

437-Q. The Effect of Grain-Size on the Structural Changes Produced in Aluminium by Slow Deformation. W. A. Rachinger. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 415-418.

X-ray diffraction and metallographic methods were used to study the internal derangement of Al polycrystals of various grain sizes after slow deformation at elevated temperatures. The present work indicates that for a given temperature and rate of straining the effect of an increase in grain size is roughly equivalent to a decrease in temperature or an increase in strain rate. Further evidence is produced to confirm the existence of a deformation-induced substructure within the grains. (Q24, N3, Al)

438-Q. Observations on the Structure and Properties of Wrought Copper-Aluminium-Nickel-Iron Alloys. Maurice Cook, W. P. Fentiman and Edwin Davis. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 419-429.

A study was made of the structure and properties of complex Al bronzes containing 8-12% Al and 4-6% each of Ni and Fe. The mechanical properties of alloys containing 8, 10, and 12% Al with 5% each of Ni and Fe, representative of the three main structural classes, were determined in the quenched, quenched and tempered, hot rolled, and hot rolled and annealed conditions, and these properties are related to the structures. The effect of cold-rolling on the mechanical properties of this alloy was determined, and the structure and properties of extruded and annealed rod studied. 10 pages of photomicrographs. (Q general, M27, Cu)

439-Q. The Deformation of Low-Carbon Steel in the Blue-Brittle Range. E. O. Hall. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 331-336.

A study of the Lüders deformation of bessemer and Armco iron wires and thin strip. Jagged stress-strain curves arise from interrupted propagation of fronts of the Lüders bands, and from formation of new bands in strain-aged material.
(Q24, CN)

440-Q. Structural Studies of Plastic Deformation in Aluminum Single Crystals. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 526-529.

Discussion of paper by N. K. Chen and C. H. Mathewson; item 457-Q, 1951. (Q24, Al)

441-Q. Effect of Alloying Elements on the Elevated Temperature Plastic Properties of Alpha Solid Solutions of Aluminum. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 529.

Discussion of paper by O. D. Sherby, R. A. Anderson, and J. E. Dorn; item 456-Q, 1951. (Q23, N7, Al)

442-Q. Creep Characteristics of Some Platinum Metals at 1382° F. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 530-531.

Discussion of paper by R. H. Atkinson and D. E. Furman; item 620-Q, 1951. (Q3, Pt, Pd)

443-Q. Creep Behavior of Zinc Modified by Copper in the Surface Layer. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 531-532.

Discussion of paper by Milton R. Pickus and Earl R. Parker; item 619-Q, 1951. (Q3, Zn)

444-Q. Creep and Stress Rupture Behavior of Aluminum as a Function of Purity. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 532-533.

Discussion of paper by Italo S. Servi and Nicholas J. Grant; item 682-Q, 1951. (Q3, Q4, Al)

445-Q. Titanium—Metals of Tomorrow. James V. Thompson. *Mines Magazine*, v. 42, Apr. 1952, p. 19-24.

Physical and mechanical properties are compared with Al, Mg, stainless, low-carbon steel, and brass. Advantages and outstanding qualities.
(Q general, P general, Ti, Al, Mg, SS, AY, Cu)

446-Q. Friction and Wear. J. Pomey. *National Advisory Committee for Aeronautics*, Technical Memorandum 1318, Mar. 1952, 108 pages. (Translated from Office National d'Etudes et de Recherches Aeronautiques, Rapport Technique No. 36, 1948.)

General remarks on friction and wear; hydrodynamic lubrication; greasy (boundary) friction; seizure; and dry friction. Includes discussion of bearing-metal factors. (Q9, SG-c)

447-Q. Hydrogen Embrittlement of Steel; Review of the Literature. R. W. Buzzard and H. E. Cleaves. *National Bureau of Standards*, Circular 511, Sept. 24, 1951, 29 pages.

Includes selected bibliography of about 1200 references. (Q23, ST)

448-Q. Interferometric Studies of Hardness Test Indentations: Investigations on Tungsten Carbide, Steel, Duralumin and Tin. S. Tolansky and D. G. Nickols. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 410-421.

Studies were made on surface distortions which occur on metal surfaces which have received hardness test indentations from both diamond pyramid and diamond cone indenters. 11 ref.
(Q29, C-n, ST, Al, Sn, W)

449-Q. Twin Formation in Cadmium. N. Thompson and D. J. Millard. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 422-440.

Experiments on the formation of twins in single-crystal wires of Cd under tension demonstrate the essentially discontinuous nature of the process of twin growth, and produce evidence in favor of a critical resolved shear stress law for twinning. Twinning can contribute to creep at room temperature but not at 90° A. Dislocation mechanism for the growth of a twin. 18 ref. (Q24, Cd)

450-Q. The Nature of Work-Hardening. J. S. Koehler. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 52-59.

Theoretical study mainly concerned with source-hardening. Comparison of theory and experiment for Al single crystals. Graphs and diagrams. (Q24, Al)

451-Q. Note on Embrittlement From Alkaline Tin Plating. C. A. Zapffe and M. E. Haslem. *Plating*, v. 39, May 1952, p. 468-469, 485.

Results for stainless and carbon steel in two sodium stannate baths. (Q23, L17, CN, Sn)

452-Q. Properties of Materials and Engineering Uses of Cast Metals. R. W. Bailey. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A23-A31.

Previously abstracted from *Foundry Trade Journal;* see item 393-Q, 1951. (Q general, E general, CI, Cu)

453-Q. The Elastic Stability of Bent I-Section Beams. J. F. Davidson. *Proceedings of the Royal Society*, ser. A, v. 212, p. 80-95.

When made into extruded girders, Al is subject to instability, because of its low modulus and of the thin-walled sections which can be produced. Experimental and theoretical investigation of the instability of such girders. (Q21, Al)

454-Q. Improved Method for Estimating Fatigue Life of Bevel and Hypoid Gears. Wells Coleman. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 314-331.

A graph is plotted using calculated stress and number of cycles to failure resulting from extensive bending-fatigue tests on both bevel and hypoid gears. Fatigue life of new gear designs may be estimated. Graphs, formulas, and diagrams.
(Q7, ST)

455-Q. The Strength of Metals. E. N. da C. Andrade. *Times Review of the Progress of Science*, Autumn 1951, p. 1-3.

Brief discussion of strength metals in general, in terms of recent laboratory studies on microstructure. (Q23, M27)

456-Q. Determination of Plate Compressive Strengths at Elevated Temperatures. George J. Heimerl and William M. Roberts. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 251-256. (Technical Report 960.)

Results of local-instability tests of H-section plate assemblies and compressive stress-strain tests of extruded 75S-T6 Al alloy, obtained to determine flat-plate compressive strengths under stabilized elevated-temperature conditions, are given for temperatures up to 600° F. They show that methods available for calculating critical compressive stress at room temperature can also be used at elevated temperatures if the applicable compressive stress-strain curve for the material is given. (Q28, Al)

457-Q. Elastic and Plastic Buckling of Simply Supported Solid-Core Sandwich Plates in Compression. Paul Seide and Elbridge Z. Stowell. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 357-366. (Technical Report 967.)

Charts are presented for plates having face materials of 24S-T3 Al alloy, 75S-T6 Alclad Al alloy, and stainless steel. Comparison of computed and experimental buckling stresses. (Q28, Al, SS)

458-Q. Fundamental Effects of Aging on Creep Properties of Solution-Treated Low-Carbon N-155 Alloy. D.

N. Frey, J. W. Freeman, and A. E. White. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 939-968. (Technical Report 1001.)

Method for investigating fundamental mechanisms by which processing, heat treatment, and chemical composition control the properties of alloys at high temperatures. This method uses metallographic examination—both optical and electronic; studies of X-ray diffraction-line widths, intensities, and lattice parameters; and hardness surveys. Mechanical properties at high temperatures are then measured and correlated with structural conditions. 13 ref. (Q3, M21, N7, SG-h)

459-Q. Copper Alloys With Improved Mechanical Properties and Electrical Conductivity. (In Czech.) Ferd. Kralik. *Hutnické Listy,* v. 7, Feb. 1952, p. 71-72.

Properties of various Cu-Cd, Cu-Ag-Cd, Cu-Cr, Cu-Ni-Si, Cu-Be, and Cu-Ag alloys. (Q general, P15, Cu)

460-Q. Contribution to the Study of the Resistance of Unalloyed Carbon Steel in the Case of Hydrostatic Deformation. (In French.) H. B. Böhler and E. H. Schulz. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 49-53.

Cohesive strength of steel as a function of carbon content, and the influence of rather high temperatures on this property. Tables and graphs. 12 ref. (Q23, CN)

461-Q. Some Factors Affecting the Creep Resistance of Heat Resistant Austenitic Alloys. (In French.) Xavier Wache. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 56-68.

Results of thermomagnetic analysis of carburized austenitic steels and of physicothermal analysis of austenites hardened by addition of Ti and Al. Charts, micrographs, and tables. (Q3, SS)

462-Q. Considerations on Creep. (In French.) A. Fotiadi. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 69-74.

Creep of metals at low temperatures, and the mechanical properties of refractory alloys with regard to deformation and cracking, plastic deformations, superposition and repetition of strains, and resistance of refractory alloys to various loads. (Q3, SG-h)

463-Q. Effect of Heat Treatment on the Properties of Drawn Steel Wires. (In German.) Hermann Wedl. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, Mar. 1952, p. 51-58.

Effect of patenting and annealing on mechanical properties of five different low-Cr steels. Tables, graphs, and photomicrographs. 16 ref. (Q general, J23, J25, AY)

464-Q. Origin and Prevention of Stress Patterns on German Silver and Brass. (In German.) Richard Ergang and Stefan Welz. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 45-49.

The behavior of German silver and brass is shown to be analogous to that of steel. Data are charted; micrographs. (Q25, Cu)

465-Q. Significance of Dependence of Work Hardening Curves of Aluminum Monocrystals on Orientation. (In German.) P. Haasen and G. Leibfried. *Zeitschrift für Physik,* v. 131, No. 4, 1952, p. 538-543.

Strength increase is ascribed to effective shear stresses along slip planes which prevent slipping in the regular slip system. Graphs and tables. 12 ref. (Q24, Al)

466-Q. Measurement of Residual Stresses in Rods and Tubes by Means of Expansion Strips. (In German.) Hans Bühler and Walter Schreiber. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Mar. 11, 1952, p. 216-218.

Use and advantages as compared to mechanical expansion meters. Details of the measuring process; data are tabulated and charted. (Q25)

467-Q. Bending as a Test Method for Cast Aluminum Alloys. (In Italian.) F. Gatto. *Alluminio,* v. 21, Jan. 1952, p. 15-25.

Application of static bend tests. Calculations, tables, diagrams, and graphs. (Q5, Al)

468-Q. Bend Tests During Gas Pressure Welding of Tubes. (In Russian.) S. M. Skorodzievskii. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 22-23.

Tests were made on two lots of butt welded steel tubes. Tables and graphs. (Q5, K2, CN)

469-Q. Brittle Fracture of Metals. (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Sept. 1951, p. 1390-1414.

An answer to comments by N. N. Davidenkov on a previous article by the author. Stresses in notched bars and similar questions are discussed. 30 ref. (Q26)

470-Q. Discussion of Work of G. V. Uzhik in the Field of Problems of Strength and Plasticity. Concerning the Paper by V. I. Kudriavtsev, "Dependence Between Uzhik's Resistance to Fracture". (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Oct. 1951, p. 1567-1572.

The authors answer to Kudriavtsev's criticisms. Data are tabulated. (Q23)

471-Q. Concerning N. P. Shchapov's Letter. (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Oct. 1951, p. 1574-1578.

Answer to Shchapov's criticism of the author's theory of strength. (Q23)

472-Q. The Mechanism of Fatigue. P. Litherland Teed. *Aeroplane,* v. 82, Apr. 25, 1952, p. 484-486, 487.

Reviews research since 1849. Metallic structure, intercrystalline boundaries, nonuniform distribution of stress, plastic flow, and some experimental results. 10 ref. (Q7)

473-Q. The Elastic Constants of Nickel. J. R. Neighbours, F. W. Bratten, and Charles S. Smith. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 389-393.

Determined by the pulsed ultrasonic method. Wave velocity measurements on four Ni single crystals of general orientation, which were magnetically saturated, were combined by the approximation method. Tables and graphs. 12 ref. (Q21, Ni)

474-Q. Deformation and Fracturing of Thick-Walled Steel Cylinders Under Explosive Attack. John Pearson and John S. Rinehart. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 434-441.

Cylinders were internally loaded by explosive charges. They were made of 1020 steel with wall thickness range ½ to 4 in. Microstructure analysis of fragments and strain measurements. Graphs, photographs, and photomicrographs. 20 ref. (Q26, M27, CN)

475-Q. Elastic Constants of Beta-Brass Single Crystals. Robert A. Artman and Donald O. Thompson. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 470-474.

A study showing dependence of elastic constants upon composition. Moduli for different compositions may be obtained by use of a linear interpolation in terms of the atomic ratio of Cu to Zn. Results of bending - torsion measurements and agreement between measured and calculated values. Graphs, diagrams, and tables. 13 ref. (Q21, Cu)

476-Q. Temperature Dependence of Young's Modulus and Internal Friction of Single Crystals of Beta-Brass. Robert A. Artman. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 475-482.

A study using a composite piezoelectric oscillator. Modulus measurements were made in the range 25-480° C. and internal friction at 21 and 42 kc. per sec. from room temperature to above the critical temperature of order-disorder. Effects of inclusions on the α-phase. Graphs, table, and photomicrograph. 13 ref. (Q22, Cu)

477-Q. Stress-Strain Relationship of a High-Tensile Weldable Structural Steel. D. W. Smith, J. G. Whitman, and C. L. M. Cottrell, *Metallurgia,* v. 45, Apr. 1952, p. 169-172.

Investigation, up to 0.3% proof stress, of a low-carbon, Mn-Mo steel being considered for use in construction of a prefabricated transportable bridge. Data for as-rolled and heat treated conditions. Microstructure, tables and graphs. (Q27, M27, AY)

478-Q. Progress in Hardness and Micro-Hardness Testing in 1951. *Metallurgia,* v. 45, Apr. 1952, p. 213-214.

A brief account based on a section of "The Diamond Tool Industry in 1951" published by the Industrial Diamond Information Bureau. 38 ref. (Q29)

479-Q. Some Problems in the Fabrication of N-155 Alloy. Hiram Brown. *Metal Progress,* v. 61, May 1952, p. 67-72.

Their solution as encountered in early usage of this material. Includes mechanical properties, surface defects, and variations in heat treatment. Tables and photomicrographs. (Q general, SS, SG-g, h)

480-Q. Grain Displacement in Metal Stressed Below Elastic Limit. Norman P. Goss. *Metal Progress,* v. 61, May 1952, p. 87-91.

A study by X-ray diffraction methods of movements within the mosaic substructure of coarse-grained metal under moderate stress. Materials were 3% Si steel and high purity annealed Fe. (Q24, AY, Fe)

481-Q. High Yield of Weld Metal. R. A. Huseby. *Metal Progress,* v. 61, May 1952, p. 96.

Brief note comparing tensile data for test pieces cut from a pressure vessel made from Type 347 plate and SW157 welds. (Q27, SS)

482-Q. Wrought Alloys of Magnesium-Misch Metal. *Metal Progress,* v. 61, May 1952, p. 140, 142. (Condensed from "Development of Magnesium-Cerium Forged Alloys For Elevated-Temperature Service." K. Grube, R. Kaiser, L. W. Eastwood, C. M. Schwartz, and H. C. Cross.)

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Note 2325. See item 250-Q, 1951. (Q3, M27, Mg)

483-Q. Internal Friction and Aging of Steel. *Metal Progress,* v. 61, May 1952, p. 144. (Condensed from "Internal Friction in Iron and Steel". J. D. Fast and L. J. Dijkstra.)

Previously abstracted from *Philips Technical Review.* See item 274-Q, 1952. (Q22, Q8, N7, Fe, ST)

484-Q. Creep in Copper. *Metal Progress,* v. 61, May 1952, p. 162, 164, 166. (Condensed from "The Creep and Softening Properties of Copper for Alternator Rotor Windings". N. D. Benson, J. McKeown, and D. N. Mends.)

Previously abstracted from *Journal of the Institute of Metals.* See item 10-Q, 1952. (Q3, Cu)

485-Q. Wear on Cemented Carbide Tools. *Metal Progress,* v. 61, May 1952, p. 186, 188. (Condensed from "Some Factors Affecting Wear on Cemented Carbide Tools", E. M. Trent.)

Previously abstracted from *Engineer.* See item 64-Q, 1952. (Q9, C-n)

486-Q. A Theoretical Estimate of the Effect of Radiation on the Elastic Constants of Simple Metals. G. J. Dienes. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 228-234.

An approximate theoretical treatment of change in elastic constants of simple metals caused by the presence of a given small fraction of interstitial atoms and vacancies. Elastic constants are calculated from interatomic potentials employing a simple exponential function for Cu and a Morse function for Na. Tables and graphs. 18 ref. (Q21, Cu, Na)

487-Q. Fatigue Properties of Cast Aluminum Alloys. R. L. Templin, F. M. Howell, and J. O. Lyst. *Product Engineering,* v. 23, May 1952, p. 119-123.

Extensive tests on 28 alloys cast in sand molds and 17 alloys cast in permanent molds reveal there are no pronounced differences in their fatigue strengths. Table lists nominal compositions and tensile properties for fatigue-test conditions. Wide ranges of tensile properties result from heat treatment. These differences in static property values are not reflected in the fatigue strengths of the alloys. Graphs. (Q7, Al)

488-Q. Accelerated Wear Tests for Diesel Engines. *SAE Journal,* v. 60, May 1952, p. 50-53. (Based on "Evaluation of Wear in Diesel Engines by Means of Accelerated Tests" by Robert E. Kennemer.)

A series of laboratory tests including the following types: abrasive wear tests, corrosive wear tests, and scuffing tests, performed in multicylinder engines with split setups used to get accurate comparative data. Graphs. (Q9, R11)

489-Q. French Position With Respect to Mechanical Tests for Acceptance of Gray Cast Iron Pieces. (In French.) Etienne Doat. *Fonderie,* Mar. 1952, p. 2846-2850.

Tables and diagrams. (Q general, CI)

490-Q. Hardness and Strength Properties of Metal. (In French.) D. Tabor. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 208-210.

A brief theoretical discussion of the relation between the elastic limit and the hardness of metal. Tables and graphs. (Q29, Q21)

491-Q. Fatigue-Test Programming. Variable-Amplitude Rotating Bend Tests. (In Italian.) Luigi Locati. *Metallurgia Italiana,* v. 44, Apr. 1952, p. 135-144.

Variation in stresses imposed on the samples was found to differ greatly from that expected on the basis of the sine-wave function. A new apparatus by which rotating bend tests with stresses varying with time can be carried out according to a pre-established program. Results for a series of carbon, low-alloy, and stainless steels, and for an Al-base alloy. 22 ref. (Q7, ST, Al)

492-Q. The Problem of the Number of Cycles During Fatigue Testing of Welded Joints. (In Russian.) V. I. Shabalin. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 4-5.

Determination of the number of cycles of stress application necessary to indicate the fatigue strength of welds, particularly in steel of the "Cromansil" type. Tables, graphs, and photomicrographs. (Q7, AY)

493-Q. D.T.D. 424—The Versatile Light Alloy. A. P. Fenn. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A183-A189; disc., p. A190-A197.

Previously abstracted from *Institute of British Foundrymen;* item 501-Q, 1951. (Q general, E11, E13, Al)

494-Q. (Book) **The Elevated-Temperature Properties of Stainless Steels.** Ward F. Simmons and Howard C. Cross. 120 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $4.00.

A graphical summary of high-temperature data for commercially produced stainless steels. The book will aid in establishing stress values and code requirements, and in equipment design. (Q general, SS)

495-Q. (Book) **Finite Deformation of an Elastic Solid.** Francis D. Murnaghan. 140 pages, 1951. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $4.00.

Considers squares and higher powers of the strain components in the theory of elasticity. Application of the theory to larger deformations and stresses than those allowed by the classical theory. Matrixes are used methodically with a preliminary explanation in the first chapter. Topics of special interest are the importance of nonisotropic media and the problem of deformation under extreme pressures. (Q21)

R

CORROSION

204-R. Corrosion and Pipe Protection. Marshall E. Parker. *American Gas Journal,* v. 176, Apr. 1952, p. 25-28.

Underground corrosion of iron and steel. Standard electrode potentials are measured for most metals. Includes role of H_2, anodes and cathodes, cathodic protection, pipe coatings and sacrificial anodes. (R10, Fe, ST)

205-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Apr. 1952, p. 89A, 90A, 92A.

Data in chart form for corrosion of six materials—Pb_2, carbon steel, Durimet 20, Duriron, and two high-Ni alloys, by H_2SO_4 at temperatures up to boiling and concentrations from 0-100%. (R5, Pb, CN, Ni, CI, SG-g)

206-R. Molten Sulphur; Corrosion of Steel at Temperatures up to 450° C. *Iron and Steel,* v. 25, Apr. 1952, p. 137.

Mechanism and rate law for the corrosion of metals with the formation of sulphides. The progress of corrosion was recorded conductometrically. Weight-loss tests were made, and samples of the sulphide scale were examined by microscopic and X-ray methods. (R6, ST)

207-R. An Electron Diffraction Study of Films Formed by Sodium Nitrite Solution on Iron. M. Cohen. *Journal of Physical Chemistry,* v. 56, Apr. 1952, p. 451-453.

Mechanism by which $NaNO_2$ inhibits corrosion of Fe. The passive film formed by $NaNO_2$ is γ-Fe_2O_3 with a small amount of γ-$Fe_2O_3.H_2O$. The oxide film is formed by a reaction between nitrite (and oxygen) and metal at liquid-metal interface, with adsorption of inhibitor as a probable intermediate step. Tables. (R10, Fe)

208-R. The Electromotive Series for Metals and Alloys. *Metal Finishing,* v. 50, Apr. 1952, p. 89.

A list with brief notes. (R1)

209-R. Sweet-Oil-Well Corrosion. H. L. Bilhartz. *Oil and Gas Journal,* v. 50, Apr. 21, 1952, p. 116-118, 151, 153.

See abstract from *World Oil;* item 198-R, 1952. (R7, ST, Ni, Zn)

210-R. New Light on How to Combat Corrosion in Water-Flood Operations. F. A. Prange. *Oil and Gas Journal,* v. 50, Apr. 14, 1952, p. 148, 150-152, 155.

Appraisal of three clear-cut types of solutions to the problem of controlling this particular situation. (R4, ST)

211-R. Weld Decay in Stainless Steels. Marshall E. Parker. *Oil and Gas Journal,* v. 50, Apr. 21, 1952, p. 179.

A brief discussion in reference to intergranular corrosion. (R2, K general, SS)

212-R. How to Make Brass Liners Work. William C. Uhl. *Petroleum Processing,* v. 7, Apr. 1952, p. 475-477.

Brass linings are used to provide satisfactory corrosion resistance in lines and vessels carrying gasoline liquid and vapor. Sketches show some of the methods Sun Oil Co. worked out and applied in lining process lines, vessels, and fittings. (R7, Cu)

213-R. Prevention of Corrosion of Ships in Sea Water. II. Cathodic Protection by Impressed Currents. K. N. Barnard. *Research,* v. 5, Apr. 1952, p. 176-180.

The advantages and disadvantages of impressed current systems. (R10, CN)

214-R. Trends in Gas Turbine Engine Materials. *SAE Journal,* v. 60, Apr. 1952, p. 58-63; disc. p. 63. (Excerpts from "Trends in Gas Turbine Engine Materials", by R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr.)

Results of a series of corrosion fatigue tests on 13 turbine-blade alloys. All are steels except one Ni-base and one Ti-base alloy. (R1, T25, ST, Ni, Ti, SG-g, h)

215-R. The Corrosion of 18-8 Stainless Steel in Acid Copper Sulphate. (A Condensation.) J. Bleton, J. Blanot, and P. Bastien. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 369-370.

In view of variance in corrosion resistance in two melts of nearly identical composition, an investigation was made to determine correction. 91 melts were studied. (R6, SS)

216-R. The Occurrence of Intercrystalline Attack in Material to B.S. Specification L.40 during Anodic Treatment. B. W. Mott and M. B. Waldron. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 149-154.

Experiments were made on various types of forged material to B.S. Specification L.40 with surfaces in both sound and unsound conditions. Anodic treatment was carried out in both chromic acid and H_2SO_4 acid baths to D.T.D. 910B and dyeing was carried out with black dyestuffs, with and without additions of free acetic acid. (R2, L19, Al)

217-R. Corrosion Tests of Wrought and Cast Aluminium Alloys Anodised in Chromic Acid Solutions. E. G. Savage. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 155-161.

Alloys anodized by the Bengough-Stuart process (D.T.D. 910A), or by a 45-min. treatment at 40 volts in 10% chromic acid solution, did not reveal any differences in the protection afforded by the two treatments, whether or not they were supplemented by organic coatings.

When used for the treatment of duralumin, the modified process reduced the output of a given plant owing to the higher current density required. Tabulated data. (R11, L19, Al)

218-R. Corrosion Tests of Duralumin Anodically Treated in Sulphuric Acid Baths Containing Aluminium Salts. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 162-164.

Seawater spray tests made on duralumin, after being anodically treated in 20% (vol.) H_2SO_4 solutions containing dissolved Al salts up to saturation, show that the serviceability of these films is practically equal to that of anodic films produced in 20% (vol.) H_2SO_4 free from Al salts. Anodic films which have been sealed by immersion in boiling water for 30 min. are more protective than unsealed films. (R11, L19, Al)

219-R. Corrosion Tests of Duralumin Anodically Treated in Chromic Acid Solutions. H. C. Davis. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 165-170.

Investigation of the resistance to corrosion by seawater of specimens of duralumin to B.S. Specification 3L3 anodically treated in electrolytes containing 3, 5 and 10% CrO_3 at various stages of exhaustion, using the normal Bengough voltage-cycle. Some specimens were also treated in 10% CrO_3 solutions at constant voltages of 30 and 40 v. (R11, L19, Al)

220-R. Variations in Corrosion Properties on Different Parts of Magnesium Alloy Sheet. E. R. W. Jones and M. K. Petch. (Appendix on the Determination of Small Amounts of Iron in Magnesium Alloys. A. Bacon and H. C. Davis.) "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 171-186.

Seawater spray corrosion tests were carried out on chromate-treated specimens selected at regular intervals from large sheets of Mg alloys to specifications D.T.D. 118 and 120A, in order to discover any variation in corrodibility from part to part of the sheets. Method for the determination of small amounts of Fe in Mg alloys. (R11, L14, S11, Mg)

221-R. Corrosion Tests on Aluminium Alloy Sheet Clad With an Aluminium Coating of 99.36% Purity. C. Braithwaite. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 255-257.

Results of tests show that no appreciable loss of mechanical properties with the 99.5% or 99.36% Al coating occurred as a result of corrosion. Corrosion was, however, more severe with these materials than with a purer cladding material. (R11, L22, Q general, Al)

222-R Tantalum. Allan L. Percy. *Chemical Engineering*, v. 59, Apr. 1952, p. 259-260, 262-264.

Charts giving corrosion data for a number of corrosives. (R general, Ta)

223-R. Concentrating Films: Their Role in Boiler Scale and Corrosion Problems. H. M. Rivers. *Combustion*, v. 23, Apr. 1952, p. 57-63.

The concept is developed that a film of a very highly concentrated solution tends to form on steam-generating surfaces and may cause scale formation. Characteristic effects of concentrating films and related deposition problems. (R2)

224-R. How Does Titanium Scale at High Temperatures? P. H. Morton and W. M. Baldwin, Jr. *Iron Age*, v. 169, May 1, 1952, p. 133-138.

Characteristics of material from the U. S. Bureau of Mines that was studied. Summary of existing information on the scaling of Ti in O_2 or N_2. (R2, Ti)

225-R. A New Anodic Method for the Transfer of Oxide Films From Heat-Tinted Iron to Glass or Plastic. U. R. Evans and R. Tomlinson. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 105-109.

The specimen carrying the oxide film to be transferred is cemented to glass, and the metal is dissolved away by anodic action, leaving the film attached to the glass. The area of the pieces transferred can be measured, and the metal (or metals) in the films estimated by micro-analysis; alternatively, by transferring to glass coated with petroleum jelly, the wrinkling or curling of the film gives information about stresses present in the films when they are attached to the metal. 11 ref. (R2, Fe)

226-R. Sodium Benzoate and Other Metal Benzoates as Corrosion-Inhibitors in Water and in Aqueous Solutions. F. Wormwell and A. D. Mercer. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 150-160.

Sodium benzoate is an effective inhibitor of the corrosion of mild steel in distilled water, a moderately hard water and very dilute NaCl solutions. Electrode-potential measurements and film-stripping experiments indicate that anodic inhibition produces and maintains a continuous film. Electron-diffraction examination of the strip film has so far yielded definite evidence of γ-ferric oxide (or Fe_3O_4) only. 10 ref. (R10, CN)

227-R. Some Factors in Anodic Processes on Corroding Metals. T. P. Hoar and U. R. Evans. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 212-218.

It is suggested that the onset of aqueous corrosion is controlled by the relative ease with which cations can pass through the original air-formed oxide film on the metal. A rapid supply of dissolved O_2 to all parts of the surface may arrest cations as they emerge, thus thickening the film and preventing corrosion; a far more rapid supply of O_2 is needed to prevent corrosion on Fe or Zn than on stainless steel, but the supply needed is diminished if an inhibitor is present. 46 ref. (R1, R10, Fe, Zn, SS)

228-R. Tests on Heat-Resisting Cast Irons. M. M. Hallet. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 321-329.

Data for all usual heat resisting cast irons, for selection of most suitable material for given conditions. Includes studies on resistance to scaling, and failure by cracking. Tables, graphs, and micrographs. (R2, Q26, Cl)

229-R. Oxidation of Titanium. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 534-536.

Discussion of paper by M. H. Davies and C. E. Birchenall. See item 411-R, 1951. (R2, Ti)

230-R. On the Mechanism and Kinetics of the Scaling of Iron. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 536-540.

Discussion of paper by M. H. Davies, M. T. Simnad, and C. E. Birchenall. See item 412-R, 1951. (R2, Fe)

231-R. Combination of Metals and Non-Metals. U. R. Evans. *Metal Treatment and Drop Forging*, v. 19, Apr. 1952, p. 172.

Mechanism with reference to chemical reactions with liquids. Considers Fe, Cu, Zn, and Ag. (R1, Fe, Cu, Zn, Ag)

232-R. The Theory of Overvoltage and Mechanism of the Attack of Metals in Solution Out of Contact With Oxygen. (In French.) René Audubert. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1166-1168.

Theory which makes it possible to specify whether dissolution is either direct or the result of a secondary reaction. Includes calculation. (R1)

233-R. Electrolysis of Phosphoric Acid Between Copper Electrodes. Case of Weak Current Densities. (In French.) Denise Laforgue-Kantzer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 17, 1952, p. 1284-1287.

Experimental and theoretical discussion of the mechanism of anodic dissolution of Cu at very weak current densities, particularly when the Cu+ ion concentration is high. Graphs. (R1, Cu)

234-R. The Cathodic Corrosion of Iron and the Anodic Formation of Crystallized Ferrite by Electrolysis of Molten Sodium Hydroxide. (In French.) M. Dodero. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C210-C213: disc., p. C213.

Electrolysis of molten NaOH between 500 and 750° C., using iron electrodes under particular conditions of current density and distance between electrodes. Cathodic corrosion and anodic formation of crystallized sodium ferrite were observed. Graphs and diagrams. (R1, Fe)

235-R. Aluminum-Copper Clamps for Overhead Lines. (In German.) G. Dassetto. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 31-32.

Galvanic corrosion occurs when Al and Cu come in contact, especially in the presence of moisture. Method of prevention in which a clamp of 99.5% Al is used as "material reserve", being attacked instead of the Al wire. (R1, Tl, Al, Cu)

236-R. The Problem of Corrosion in the Cooling Tubes of Transverse-Tube Coolers. (In German.) Wilhelm Guntermann. *Gas und Wasserfach*, v. 93, Apr. 1, 1952, p. 169-171.

Reduced solubility of gases in the heating water may cause O_2 and CO_2 to accumulate along the tube walls and thus contribute to corrosion. Graphs and diagrams. (R4)

237-R. Aluminum and Water. (In German.) Max Schenk. *Metalloberfläche*, v. 4, sec. B, Mar. 1952, p. B33-B36.

Corrosion resistance of Al to various types of water, such as rain water, fresh water, sea water, and distilled water. Reasons for the existence of corrosion resistance; nature of the different types of corrosion. (R4, Al)

238-R. Chemical Changes on the Surface of Tin-Lead-Copper Alloys. (In German.) R. Strebinger and R. Niederhuemer. *Mitteilungen des Chemischen Forschungsinstitutes der Wirtschaft Osterreichs*, v. 6, Feb. 1952.

Chemical, microchemical, and microscopic studies of surface damage on the metal ornaments of stone coffins. Photomicrographs. (R11, Pb, Sn, Cu)

239-R. Rust. (In German.) Manfred Ragg. *Werkstoffe und Korrosion*, v. 3, Mar. 1952, p. 102-105.

Rust damage to iron structures and resulting economic losses; theories of rusting, effects of inclusions, etc. Formation of Fe-H alloys at the surface. Relation to behavior of the iron column at Delhi, India, iron objects in the pyramids, iron construction at high altitudes. Phenomenon of passivation. (R1, R10, Fe)

240-R. Active State and Spontaneous Repassivation of Electrically Activated Iron in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Feb. 1952, p. 106-115.

Use of oscillography to determine minimum, maximum, and stationary potential in the active state; potential of the critical point at repassivation; and related times as functions of type of iron, HNO_3 concentration, HNO_3 concentration, persistent cathodic current density, stirring, temperature, and Fe-ion concentration. Tables and graphs. 45 ref. (R10, Fe)

241-R. The Influence of Oxide Layers, as Well as of Chlorine Ions Upon the Electrochemical Behavior of Passive Iron, Chromium, and Iron-Chromium in Dilute Nitric Acid. (In German.) Theo Heumann and Wolfgang Rösener. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 42-44.

Report on tests with Cr and on an Fe alloy containing 20% Cr, as well as on alloys containing less Cr. Polarization curves. Stability of the oxide film. 10 ref. (R1, Fe, Cr)

242-R. Influence of Phosphorus on the Oxidation of Iron at High Temperatures. (In Italian.) Nello Collari. *Metallurgia Italiana,* v. 44, Mar. 1952, p. 97-102.

The metalloid can develop a remarkable protective action, due to the formation of an iron-phosphate rich layer between the metal surface and the exterior oxidized layers. The layer of phosphate governs the oxidation phenomenon reducing the diffusion activity of the iron. Micrographs and tables. (R2, Fe)

243-R. Study of Some Electrochemical Phenomena by Means of an Electrical Weighing Device. (In Italian.) Paolo Spinedi. *Metallurgia Italiana,* v. 44, Mar. 1952, p. 109-116.

Passivation behavior of Ni, Sn, and Ag was studied. In the case of Ni it was found that variations in the exposed surface of the test bars examined result in a characteristic surface critical parameter curve. For Sn, the curves obtained show how the passivation process is influenced by the valence state in which the element dissolves in the etching medium under the action of an applied emf. Ag is anodically oxidized by a mechanism which leads to very slight modifications of the critical parameters. (R10, Ni, Sn, Ag)

244-R. Structure and Corrosion. (In Russian.) G. V. Akimov. *Izvestiia Akademii Nauk USSR,* Section of Chemical Sciences, Sept.-Oct. 1951, p. 469-480.

An experimental study was made of the corrosion of several metals and alloys by a variety of media. The structure of the metal and corrosion products was studied in relation to the rate and process of corrosion. Data are tabulated and charted. (R general, M27)

245-R. Oxidation of Magnesium and Its Alloys at Elevated Temperatures. (In Russian.) I. A. Makolkin. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 460-470.

Surface oxidation of Mg, Al, Zn, and two Mg-Al alloys in air was investigated. The two alloys were also tested in N_2, CO_2, and SO_2. Equipment; tabulated and charted data. (R2, Mg)

246-R. Influence of Deformation on the Corrosion of Metals. (In Russian.) E. M. Zaretskii. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 477-484.

See abstracts of parts I and II, *Chemical Age;* items 344-R and 368-R, 1951.

(R general, R11, Q24, Al, Zn, Cu, ST)

247-R. A Study of the Passivity of Stainless Steel. (In Russian.) G. P. Maitak and N. N. Gratsianskii. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 545-547.

The electrode potentials of 18-8 specimens were measured in H_2SO_4 and $FeSO_4$-H_2SO_4 solutions. Data are tabulated. (R10, SS)

248-R. Corrosion of Metals by Hydrocarbon Solutions of Carboxylic Acids. (In Russian.) L. G. Gindin and V. A. Kazakova. *Zhurnal Prikladnoi Khimii,* v. 24, Sept. 1951, p. 958-969.

The corrosion of Mg, Fe, and Pb by various organic acids dissolved in hydrocarbons was investigated. Data are tabulated. 15 ref. (R6, Mg, Fe, Pb)

249-R. Corrosion of Copper and Lead by Hydrocarbon Solutions of Iodine. (In Russian.) L. G. Gindin and M. V. Pavlova. *Zhurnal Prikladnoi Khimii,* v. 24, Oct. 1951, p. 1026-1032.

Results of laboratory investigation. Equipment and tabulated data. (R6, Cu, Pb)

250-R. Film-Rupture Mechanism of Stress Corrosion. Hugh L. Logan. *Journal of Research of the National Bureau of Standards,* v. 48, Feb. 1952, p. 99-105.

A study of the mechanism of stress-corrosion. Films were removed by abrasion in an argon atmosphere from surfaces of an Al alloy, two brasses, a Mg alloy, and low-carbon steel. Stress-corrosion is postulated to occur, in corrosive media, at stresses sufficient to rupture the protective film, by electrolytic action between the filmed (cathodic) and film-free (anodic areas). Graphs and charted data. 15 ref. (R1, Al, Cu, Mg)

251-R. Effect of Phosphorus on Magnesium Alloys. *Metal Progress,* v. 61, May 1952, p. 156, 158, 160, 162. (Condensed from "The Effect of Phosphorus on the Corrosion Resistance of Magnesium and Some of Its Alloys". E. F. Emley, A. C. Jessup, and W. F. Higgins.)

Previously abstracted from *Journal of the Institute of Metals.* See item 404-R, 1951. (R general, Mg)

252-R. How Good Are Substitute Radiator Materials? *SAE Journal,* v. 60, May 1952, p. 58-64.

A discussion emphasizing the corrosion aspect, by a panel composed of R. W. Scoville, Joseph Gurski, R. J. Birkholz, J. H. Cooper, and J. R. Holmes. Considers Al; brass; Pb-alloy, Cu, and brass-coated steel; Zn fins; bare and painted steel; redesigning; and corrosion inhibitors. (R general, T21, Cu, Al, Pb, Zn, ST)

253-R. Report on the Conservation of Metals by Corrosion Control. Georges Chaudron. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 212-213; disc., p. 240-244.

Defines the problem; outlines various corrosive environments. (R general)

254-R. Costs of Corrosion to the United States. Herbert H. Uhlig. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 213-218; disc., p. 240-244.

Economic estimate of direct costs, showing specific dollar figures for a series of items. 15 ref. (R general)

255-R. The Costs of Corrosion and of Its Control. W. H. J. Vernon. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 218-222; disc., p. 240-244.

In relation to the world shortage of metals and the increasing demands upon the world's metal resources. Older estimates of the annual loss of steel and iron by corrosion are reviewed in the light of present knowledge. Large-scale reduction in the corrosivity of the main environments to which metals are exposed can be looked for only in atmospheric corrosion, (atmospheric pollution). A wider and more enlightened application of preventive measures is urged. 17 ref. (R general)

256-R. Prevention of Corrosion by Means Other Than Protective Coatings. F. L. LaQue. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 227-234; disc., p. 240-244.

Control or modification of environments to which metals are exposed. This may involve reduction in humidity below certain critical limits, addition of specific chemicals which inhibit corrosion reactions, control of air supply, or control of flow of corrosives in contact with the metals. Also cathodic protection, proper design, and addition of alloying elements. 90 ref. (R10)

257-R. Cost and Benefits of Conservation of Cast Iron and Steel Pipelines by Control of Corrosion. J. E. Carriere and C. A. Lobry De Bruyn. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 234-237; disc., p. 240-244.

The Dutch Corrosion Committee's specifications for pipe coatings. A chemical and physical procedure for testing of soils for corrosiveness. Economic advantages of a high-grade protective coating over a cheap coal-tar dip. (R8, CI, ST)

258-R. Fundamental Researches on Corrosion Work of the "Committee for Electro-Chemical Thermodynamics and Kinetics". Marcel Pourbaix and Pierre Van Rysselberghe. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 238-240; disc., p. 240-244.

Includes typical graphs from "Atlas of Electrochemical Equilibria" now being prepared at the Universities of Oregon and of Brussels. (R general, P15)

259-R. Corrosion and Formation of a Negative Ferric Hydrate Sol. (In French.) M. O. Charmandarian and N. N. Andronikova. *Bulletin de la Société Chimique de France,* Jan.-Feb. 1952, p. 99-101.

Corrosion of iron, in the presence of gum arabic, in water and in solutions of NaCl and Na_2SO_4, is accompanied by formation of the negative sol of ferric hydrate. Corrosion depends on amount of gum arabic and on concentration of the solutions. Data are tabulated. (R5, Fe)

260-R. Mechanism of Corrosion by Oxygen. (In French.) Rene Audubert. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 31, 1952, p. 1448-1450.

The theory of overvoltage is applied to the corrosion of metals in the presence of oxygen, making it possible to explain the mechanism of the phenomenon. (R2)

261-R. Corrosion of Cast Iron With or Without Previous Oxidation by Liquid Zinc. (In French.) Paul Bastien and Pierre Azou. *Fonderie,* Mar. 1952, p. 2831-2845.

Corrosion by molten Zn of cast iron not previously oxidized, and of cast iron previously oxidized by heating in air for 8 hr. at 850° C. Tables, graphs, diagrams, and micrographs. (R6, Zn, CI)

262-R. (Book) Performance of Lubricating Oils. H. H. Zuidema. 179 pages. 1951. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y.

Summarizes and evaluates available data on performance characteristics of lubricating oils under various conditions. The subject is approached from the point of view of performance, rather than specific application. Chapters are devoted to the lubrication process, flow characteristics, sludge and lacquer deposition, bearing corrosion, emulsification and foaming, viscosity, pour point, and extreme-pressure lubrication. (R7, SG-c)

S

INSPECTION AND CONTROL

217-S. Ultrasonic Flaw-Detector; Details of Recent Developments in the Echo Method of Flaw-Detection. *Aircraft Production,* v. 14, Apr. 1952, p. 126-129.
(S13)

218-S. X-Ray Perfect. David Goodman. *American Machinist,* v. 96, Apr. 14, 1952, p. 155-157.

Use of commercial X-ray laboratories by small industries for inspection of products. Typical radiographs. (S13)

219-S. Recording Voltmeter Checks Weld Quality. George A. Hatfield. *American Machinist,* v. 96, Apr. 14, 1952, p. 158.

Technique used in inspection of steel pipes by National Supply Co., Torrance, Calif. (S13, K9, ST)

220-S. Determination of Small Amounts of Cadmium in Lead by a One-Colour Dithizone Method. Louis Silverman and K. Trego. *Analyst,* v. 77, Mar. 1952, p. 143-148.

Procedure for the colorimetric determination of small amounts, 0.01-0.4%, of Cd in Pb or Pb alloys without prior removal of Pb. Detailed alternative procedures and extensions of the method for samples containing more or less Cd.
(S11, Cd, Pb)

221-S. The Absorptiometric Determination of Thorium in Magnesium-Base Alloys by 1-(o-arsonophenylazo)-2-naphthol-3: 6-disulphonic Acid. A. Mayer and G. Bradshaw. *Analyst,* v. 77, Mar. 1952, p. 154-158.

A red color is developed when the reagent is added to a Th solution. If Zr is present Th is separated by precipitation as oxalate. None of the other elements normally present in Mg alloys interferes. The method gives results correct to within 2%, can be applied to samples with widely differing Th content and is reasonably rapid. Preparation of the reagent. (S11, Mg, Th)

222-S. Determination of Tin in Copper-Base Alloys. Jorma Kinnunen and Bengt Merikanto. *Chemist Analyst,* v. 41, Mar. 1952.
(S11, Sn, Cu)

223-S. Draft British Standard for Sprayed Metal Coatings. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 133, 135-136, 138.

A summary and commentary on work by a committee of the British Standards Institution. (S22, L23)

224-S. The Development of Engineering Metrology. F. H. Rolt. *Engineer,* v. 193, Mar. 21, 1952, p. 448-450; Apr. 4, 1952, p. 480-483.

An extensive survey of procedures and equipment. (S14)

225-S. Liquid Steel; Measurements and Recording of Temperature at Abbey Works. *Iron and Steel,* v. 25, Apr. 1952, p. 144.
(S16, D general, ST)

226-S. The Pilot "Plus 3" Gauging System. F. W. M. Lee. *Machinery* (London), v. 80, Mar. 27, 1952, p. 531-537.

A new system devised to provide tolerances suitable for modern engineering practice. Tables and graphs. (S14)

227-S. The Analysis of Chromium Plating Baths Containing Fluorides and Fluosilicates. H. A. van Oosterhout and E. J. C. van de Velde. *Metal Finishing,* v. 50, Apr. 1952, p. 60-63, 69.

Two analytical methods are compared. The distillation method is preferred. Tables and apparatus diagram. 18 ref. (S11, L17, Cr)

228-S. Testing by Non-Destructive Methods. Rolt Hammond. *Overseas Engineer,* v. 25, Mar. 1952, p. 274-276; Apr. 1952, p. 322-324.

Recently developed practices. Importance of the electric resistance strain gage. Developments in radiographic applications in shipbuilding and other spheres, place of radioisotopes, and need for systematic procedure in radiographic testing.
(S general, Q25)

229-S. New System of Quality Control Introduced by T. I. Aluminium Ltd. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 345.

Method now in operation at the T. I. Aluminium Ltd. foundry at the South Wales Aluminium Co., Ltd. Resolven, near Neath. The speed with which results are obtained permits the checking of the metal in the furnace before it is cast, and any corrections necessary can be made immediately. The exact analysis of every slab or billet cast is known prior to casting, and the continuity of product quality and smoother production flow assured in the rolling and extrusion mills.
(S11, Al)

230-S. The Spectrophotometric Determination of Molybdenum in Molybdenum Steels. (In English.) P. Karsten and J. H. C. Van Mourik. *Recueil des Travaux Chimiques des Pays-Bas,* v. 71, Feb., 1952, p. 302-308.

The existing Mo determination with thiocyanate is put on a firmer basis. The recommended procedure is adapted to it and applied to Mo steels. (S11, AY)

231-S. A New Time-of-Gassing Test of Thickness of Cadmium Coatings, Particularly for Small Parts. S. G. Clarke and J. F. Andrew. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 267-272.

A Ni salt in concentrated HCL has a strong equalizing effect on the rate of solution of Cd coatings which otherwise dissolve at different speeds. Details of its use in a simple improved time-of-gassing method.
(S14, Cd)

232-S. The A.R.D. Magnetic Thickness Tester for Coatings on Steel. E. S. Spencer-Timms. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 273-277.

An instrument for the nondestructive determination of the thickness of electrodeposited coatings on steel.
(S14, ST)

233-S. Ammonium Nitrate Method for Determination of Thickness of Cadmium Coatings by Loss-in-Weight. S. G. Clarke and E. E. Longhurst. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 278-281.

The method is described and an appendix gives results of tests.
(S14, Cd)

234-S. Study of Magnetic Fields at a Crack in a Magnetized Steel Plate. R. D. Kodis and G. A. Darcy. *ASTM Bulletin,* Apr. 1952, p. 71-73.

A synthetic crack of varying depth in a steel plate was produced, and the magnetic field leakage around this crack studied by means of a magnetic tape-recording head. The magnetic leakage field was measured with respect to depth of crack, level of magnetizing force applied to the steel plate, and distance of the search head above the cracked plate. (S13, ST)

235-S. Estimation of Composition of Ancient Metal Objects. Utility of Specific Gravity Measurements. Earle R. Caley. *Analytical Chemistry,* v. 24, Apr. 1952, p. 676-681.

The validity and utility of specific gravity measurements as a means of estimating the composition of all kinds of ancient metal objects. 18 ref. (S11)

236-S. Industrial Use of Sound. Boyd A. Wise, Jr. *Battelle Technical Review,* v. 1, Apr. 1952, p. 40-41.

Present and potential applications, with emphasis on high-frequency sound waves or ultrasonics. Methods of generation of these waves and their use in nondestructive testing. (S13)

237-S. Use of Powder Metallurgy Techniques Means Faster Preparation of Spectrochemical Standards. Walter O. Gerber, Jr. *General Electric Review,* v. 55, May 1952, p. 58-60.

Recommended for its flexibility and for new compositions hard to analyze, including Al-containing alloy steel and stainless iron.
(S11, H general, AY, CI, Al)

238-S. Platinum-Platinum/Rhodium Thermocouples and Their Industrial Applications. Marcel Chaussain. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A60-A77; disc., p. A77-A80.

Previously abstracted from *Institute of British Foundrymen.* See item 352-S, 1951. (S16)

239-S. System of Studying Casting Defects. G. W. Nicholls and D. T. Kershaw. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A147-A163; disc., p. A163-A169.

Previously abstracted from *Institute of British Foundrymen;* item 353-S, 1951. (S12, E general)

240-S. Evaluation of Soundness in Cast Iron; Report and Recommendations of Sub-Committee T.S. 20 of the Technical Council. A. Tipper, chairman. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A292-A315; disc., p. A315-A317.

Previously abstracted from *Institute of British Foundrymen;* item 400-S, 1951. (S13, CI)

241-S. Review of Present-Day Steelfoundry Radiographic Practice. G. M. Michie. *Proceedings of the Institute of British Foundrymen.* v. 44, 1951, p. A318-A329; disc., p. A329-A331.

Previously abstracted from *Institute of British Foundrymen;* item 28-S, 1952. (S13, S19, CI)

242-S. Development and Contemporary State of Spectrographic Analysis in the USSR. (In Czech.) Adolf Pokorny. *Hutnické Listy,* v. 7, Feb. 1952, p. 62-64.

A brief outline. (S11)

243-S. Spectrographic Determination of Magnesium in Modified Cast Iron. (In Czech.) I. Ruzicka and Z. Zika. *Hutnické Listy,* v. 7, Feb. 1952, p. 64-67.

A precision within 1-4% of the total Mg content was obtained. Results are compared with those of chemical analyses. (S11, CI)

244-S. Nondestructive Testing of Materials. IV. Indirect Methods. (In French and German.) Hch. Zoller. *Pro-Metal,* v. 5, Feb. 1952, p. 957-963.

Apparatus is based on the imgrams and illustrations. (S13)

245-S. A New Ultrasonic Probing Apparatus. Its Practical Utilization. (In French.) J. Krautkrämer and H. Krautkrämer. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 89-94.

Apparatus is based on the impulse and reflection method. In the case of defects near the surface, minimum depth of defect necessary for a direct indication is lowered considerably. Even at 8 mm. depth, the echo is separated from the impulse. Measuring with precision the width of surfaces is possible on sheets 3 mm. wide. (S13)

246-S. The Importance of Spectral Analysis in Foundry Practice. (In German.) O. Werner. *Giesserei,* v. 39, Feb. 21, 1952, p. 73-81.

Advantages and limitations of spectral analysis, development of suitable equipment, methods of work in the foundry, and evaluation of the results. The problem of accuracy on the basis of the literature. Economic aspects. Data are tabulated and charted. 32 ref. (S11, E general)

247-S. Statistical Interpretation by Means of Punched Cards of Original Data for Materials Supplied for a Large Steelworks. (In German.) Heinrich Rübmann. *Stahl und Eisen,* v. 72, Mar. 27, 1952, p. 351-353.

Application of IBM-type cards to daily and monthly reports of blooming mills, pit furnaces, and rolling mills. Graphs and illustrations. (S12, F23, ST)

248-S. Oxygen Determination in Lead. (In German.) Klaus Barteld and Wilhelm Hofmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Mar. 1952, p. 102-105.

Apparatus for determining O_2 in Pb by the manometric H_2-reduction method. Data are graphed and tabulated. 10 ref. (S11, Pb)

249-S. Mathematical-Statistical Principles of Sampling and Assaying of Ores, Metals, and Residues. (In German.) Ulrich Graf and Hans-Joachim Henning. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Apr. 1952, p. 127-131.

(S11, B11)

250-S. Photoactive Coefficients of Gamma and X-Rays. (In Italian.) W. Ruff. *Alluminio,* v. 21, Jan. 1952, p. 7-14.

Factors affecting the quality of photographic images obtained by use of gamma and X-rays. Instead of the method based on thickness differences, it is suggested that photometric methods be used to determine blackening differences as a function of thickness. Applicable to nondestructive testing. Tables, graphs, and illustrations. 10 ref. (S13)

251-S. Condition for Preparing Standards for Smoothness of Turning, Grinding, or Lapping. (In Russian.) Iu. D. Ligsnii. *Stanki i Instrument,* v. 22, Sept. 1951, p. 20-27.

Preparation of samples for determining the smoothness produced by various machining operations on steel, cast iron, bronze, duralumin, and silumin. Data are tabulated and charted.
(S15, G17, ST, CI, Cu, Al)

252-S. Roundness Measurement. *Aircraft Production,* v. 14, May 1952, p. 151-153.

A high-precision recording production-type instrument is called the Talyrond. Radial magnification range is 200-10,000 and one division of 0.1 in. on the radial coordinate can represent an error range from 0.0005 to 0.000025 in. Photographs and specimen charts. (S14)

253-S. Sorting Scrap. *Aircraft Production,* v. 14, May 1952, p. 153.

Separation of high speed steel from carbon steel scrap by induced rusting. (S10, TS, CN)

254-S. Requirements of Machine-Shop Inspection. C. Walker and F. H. Greenwood. *Foundry Trade Journal,* v. 92, Apr. 24, 1952, p. 433-439.

The machinist's viewpoint of the quality of castings, from the design, jigging, accuracy, machinability, and inspection angles. Tables and photographs.
(S general, G17)

255-S. Metallurgical Applications of X-Ray Fluorescent Analysis. P. K. Koh and Betty Caugherty. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 427-433.

Techniques using a Geiger counter goniometer. Influence of potential variations, specimen preparation, and thickness of diffracting crystal. Various measurements were made on a number of common commercially pure metallic elements; on constituents of Fe-Ni, Fe-Cr, and Fe-Ni-Cr alloys; and on several steels. Tables and graphs. (S11)

256-S. Chemical Analysis of Light Metals and Alloys. II. Sec. 1. The Analysis of Aluminium and Its Alloys. S. T. Payne. *Light Metals,* v. 15, Apr. 1952, p. 127-128.

(To be continued.) (S11, Al)

257-S. A Sensitive Comparator For Measuring Wires. J. C. Evans, R. S. Marriner, and I. G. Morgan. *Machinery* (London), v. 80, Apr. 24, 1952, p. 735-739, 744.

Suitable for laboratory measurement of variation in diameter of wires as small as 0.001 in. in diameter. It is a pneumatic type and can provide a continuous record. Apparatus diagrams. (S14)

258-S. Chemical and Crystallographic Analysis With Electron Beams. *Metal Progress,* v. 61, May 1952, p. 182, 184. (Translated and condensed from "Application of Electron Beams to a Point-to-Point Chemical and Crystallographic Analysis", R. Castaing, *Recherche Aeronautique,* v. 23, 1951, p. 41-50.)

Procedure using an electrostatic-type electron microscope. Emission of characteristic X-rays permits point-to-point chemical analysis. Metallurgical applications include establishment of intermetallic diffusion curves, investigation of local variations in concentration within alloys; and especially, analysis of segregations, precipitates, or inclusions of unknown or less known nature. Possibilities exist for crystallographic analysis using a monocrystalline anode. (S11, M23)

259-S. Interpreting X-Ray Radiographs of Welds. E. M. Greve. *Petroleum Engineer,* v. 24, May 1952, p. D95-D96, D98, D100.

A discussion of weld effects and how they are disclosed by X-ray inspection. (S13, K9)

260-S. X-Rays at Work for Industry. R. A. Young. *Research Engineer* (Georgia Institute of Technology), Mar. 1952, p. 3-4, 13-18.

The three major X-ray techniques (spectroscopy, x-ray diffraction, and radiography), and some of their industrial applications.
(S13, M21, M22)

261-S. Pipe Weld Site Radiography. F. H. Gottfeld. *Welding & Metal Fabrication,* v. 20, May 1952, p. 189-190. (A condensation).

Comparative values of results of X-ray and gamma-ray inspection of 60 miles of pipeline. Some comparative laboratory tests using X-rays, cobalt source, and a betatron. Tables. (S13)

262-S. Application of the Electron Microscope to Measurement of Specific Surfaces. Determination of the Effectiveness of Grinding. (In French.) René Bernard, Emile Pernoux, and Stanislas Teichner. *Journal de Chimie physique et de Physico-Chimie biologique,* v. 49, Mar. 1952, p. 147-156.

Factors influencing above measurements. Tables and graphs. 24 ref. (S15, M21)

263-S. Use of Stigmatic Spectrography in Metallurgical Analysis. (In French.) Pierre-Jean Bouchet. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 177-184.

Use of an intermittent arc obtained with a continuous current of 220 volts; influence of composition of the electrodes. Application to the analysis of massive electrodes and powdered specimens. Schematic diagrams, graphs, and spectrograms. 10 ref. (S11)

264-S. Contribution to the Determination of Nitrogen in Certain Alloy Steels and Ferro-Alloys. (In French.) P. Racquet and M. Olette. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 221-230.

A method which makes it possible to determine by acid attack the N content in steel or ferro-alloys containing elements which form refractory nitrides. Diagrams, photographs, and tables. (S11, AY, Fe-n)

265-S. Spectrographic Determination of Impurities in Cadmium. (In Italian.) Mario Scalise. *Metallurgia Italiana,* v. 44, Apr. 1952, p. 153-157.

Results of a series of determinations. Equipment. Advantages over chemical analysis. Tables and graphs. (S11, Cd)

266-S. (Book) **ASTM Standards on Copper and Copper Alloys.** 504 pages. Feb. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

New edition covers Cu and Cu alloys, cast and wrought Cu and Cu alloy electrical conductors; and nonferrous metals used in Cu alloys. (S22, Cu)

267-S. (Book) **Practical Radiography For Industry.** H. R. Clauser. 301 pages. 1952. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $7.50.

Concrete working information on modern radiographic technique. Nearly 200 illustrations, including sample radiographs. Separate chapters are devoted to radiography with radium and Co^{60}, fluoroscopy, and miscellaneous applications. (S13)

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APPLICATIONS OF METALS IN EQUIPMENT

221-T. High Temperature Materials For the Gas Turbine. A. R. Edwards. *Australasian Engineer,* Feb. 7, 1952, p. 64-68. (From Symposium on "Modern Trends in Non-Ferrous Metals and Alloys".)

Main requirements for heat resistant materials in turbine engines. Creep resistance is the most important criterion in selecting alloys for high-temperature service, time-extension curves being the basis of design data. The best of the current alloys are grouped according to their applications—significant features of their compositions and microstructures. Future trends. 14 ref. (T25, Q3, M27, SG-h)

222-T. Molded Wings. *Aviation Age,* v. 17, Apr. 1952, p. 46-53.

Forming of plastic and metal wings. Tabular data give strength and property comparisons. (T24, Q general, CN, Al)

223-T. Aluminium as a Shipbuilding Material. E. C. B. Corlett. *Engineering,* v. 173, Mar. 28, 1952, p. 413-414; *Metallurgia,* v. 45, Mar. 1952, p. 121-126.

Previously abstracted from *Metal Industry.* See item 170-T, 1952. (T22, K general, Al)

224-T. Alloy Conservation in Furnace Construction. Kenneth W. Stookey. *Industrial Heating,* v. 19, Apr. 1952, p. 636.

Scarce Ni and Cr can be saved by redesign or material substitution. (T5, Ni, Cr, AY)

225-T. Zinc Versus Aluminum Lithographic Plates. Charles F. King. *Inland Printer,* v. 129, Apr. 1952, p. 58-60, 98-99, 101.

(T9, Zn, Al)

226-T. Modern Permanent Magnet Practice. F. G. Tyack. *Machinery Lloyd* (Overseas Edition), v. 24, Mar. 29, 1952, p. 77, 79, 81-84.

Applications for permanent magnets, performance curves, materials, manufacture; and effect of temperature. (T1, P16, SG-n)

227-T. Technical Background for Further Tin Conservation. R. R. Hartwell. *Modern Lithography,* v. 20, Mar. 1952, p. 49, 51, 53, 113, 115; Apr. 1952, p. 61, 63.

In relation to NPA Order M-25 with special reference to electrolytic tin plate for food containers, and substitutes for hot-dipped plate. Relative corrosion resistance to different foods of different thicknesses of tin plating. (T29, L17, R7, Sn, CN)

228-T. Use of Aluminum Pipe in Oil Country Applications. William B. Moore, Jr. *Petroleum Engineer,* v. 24, Apr. 1952, p. D28, D30, D32.

An illustrated survey of mechanical and corrosion resistant properties and uses. (T28, Q general, R general, Al)

229-T. Elastic Properties of Zinc Die Castings Are Useful for Adjustable Parts. *Precision Metal Molding,* v. 10, Apr. 1952, p. 48, 108, 111.

Illustrates above by briefly describing some parts made by Partlow Corp., New Hartford, N. Y., for a temperature-indicating controller. (T8, E13, Zn)

230-T. Expanded Metal. Robert P. Ingols. *Product Engineering,* v. 23, Apr. 1952, p. 199-202.

Mechanical, dimensional, and other properties of different designs of carbon steel, stainless Al, and special-property alloys. A few of the many applications are machine guards, ventilating panels, functional and decorative parts in electrical assemblies. Data are tabulated. (T7, T1, Q general, CN, SS, AY)

231-T. Super-Purity Aluminium for Roofing. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 344.

(T26, Al)

232-T. Use of Light Alloys for Railway Trucks; Some Details of French Practice. J. Grindrod. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 332-333.

Includes physical and mechanical properties. (T23, P general, Q general, Al)

233-T. A Strapping Business Built on Stainless. *Steel Horizons,* v. 14, Spring, 1952, p. 8-9.

Use by A. J. Gerrard & Co., Melrose Park, Ill., of stainless steel in strapping applications. (T5, SS)

234-T. How Are We Doing on Aircraft Propulsion? *Steel Horizons,* v. 14, Spring 1952, p. 10-13.

Brief survey emphasizing applications of stainless steel. (T24, SS)

235-T. American Wines Go Europe One Better. *Steel Horizons,* v. 14, Spring 1952, p. 14-15.

Use of stainless steel in wine production at Paul Masson Vineyards, Saratoga, Calif. (T29, SS)

236-T. Stainless Mesh Dries Wet Gases. *Steel Horizons,* v. 14, Spring 1952, p. 18-19.

Applications of stainless steel knitted wire mesh, made by Otto H. York Co., East Orange, N. J. (T29, SS)

237-T. They're Streamlining Tooth Brace Design. *Steel Horizons,* v. 14, Spring 1952, p. 22-23.

Use of stainless and tool steel in production of dental braces. (T10, SS, TS)

238-T. Ryan Does Tricks With Scrap. *Steel Horizons,* v. 14, Spring, 1952, p. 25.

Use of stainless steel scrap at Ryan Aeronautical Co., San Diego, for making pickling baskets. (T5, SS)

239-T. Wire as a Material for Product Fabrication. Paul F. Titchener. *Wire and Wire Products,* v. 27, Apr. 1952, p. 362-365, 418-419.

Facts on wire and its fabrication into wire products. (T general, F28, ST)

240-T. Steel Grain Silos. (In French.) P. Peissi. *L'Ossature Metallique,* v. 17, Mar. 1952, p. 127-133.

Advantages include stability, rapid construction, noncombustibility, lack of possible injurious effect on grain, etc. Methods of construction. (T3, CN)

241-T. Production of UONI-13, UP1, and UP2 Electrodes on Heavy-Duty Presses Using High Pressures. (In Russian.) K. V. Petran. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 16-19.

Mass production of coated electrodes for carbon steel welding. Mechanical properties of deposited metal from various electrodes are tabulated. (T5, K1, CN)

242-T. Manufacture of UONI-13/45 and UONI-13/55 Electrodes on Heavy-Duty Electrode Presses. (In Russian.) K. V. Rozzhivin. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 21-22.

Ways of applying better quality electrode coatings for increasing production. (T5)

243-T. Electrodes for Welding Cutting Tools and Machine Parts. (In Russian.) A. I. Serpokrylov, D. Ia. Sobantsev, F. I. Bukin, and N. F. Varik. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 22-23.

The preparation of high speed steel electrodes. (T5, TS)

244-T. The Curtain Wall Comes of Age. *Architectural Forum,* v. 96, Apr. 1952, p. 135-140.

Construction of two office buildings using metal-faced concrete—precast stainless-faced structural wall sections, and Al skin and sprayed concrete. Fabrication and corrosion resistance. (T26, Al, SS)

245-T. Materials in Airframe Construction. H. H. Grover and S. A. Gordon. *Battelle Technical Review,* v. 1, Apr. 1952, p. 36-39.

Table lists a few of the different materials currently in use in airframe construction and shows approximate values of some strength properties of each. A simple example illustrates the relationship of material properties to design configuration. General trends. (T24, Q23)

246-T. Aluminum Magnet Wire. Robert W. Carson. *Electrical Manufacturing,* v. 49, May 1952, p. 134-139, 312, 314, 316, 318.

Traditional use of Cu as an electrical conductor is being challenged by Al on a cost basis. Recent price trends suggest that the initial production applications for Al magnet wire presage a growing field of use. Includes data on physical and mechanical properties of Cu and Al. (T1, Q general, P general, Al, Cu)

247-T. For Certain High-Temperature Applications Liquid Metals Are Good Heat-Transfer Agents. Thomas Trocki. *General Electric Review,* v. 55, May 1952, p. 22-25, 60.

Advantages, disadvantages, and corrosion problems. Equipment for use of Na and Na-K alloys. (T5, R6, Na, K)

248-T. Use of Beryllium Copper in Plastic Molds. Malcolm A. Nichols. *India Rubber World,* v. 126, Apr. 1952, p. 80-81.

Pressure casting of the molds, properties of the molds, types of hobs, advantages of using Be-Cu, and applications other than for plastic molds. (T29, E16, Cu)

249-T. Trends to Aluminum in Power Distribution. *Modern Metals,* v. 8, Apr. 1952, p. 36, 38.

Experience with Al transmission lines. (T1, Al)

250-T. For Selling Meat—Aluminum Platters and Pans. *Modern Metals,* v. 8, Apr. 1952, p. 49-50, 52, 54.

(T10, Al)

251-T. The Outlook for Aluminum in the Electrical Industry. H. W. Biskeborn. *Modern Metals,* v. 8, Apr. 1952, p. 56-58, 60, 62.

Some of the more important accepted and potential applications for Al in the electrical industry. Tabulated data covers tensile strength of Al and Pb. (T1, Q27, Al, Pb)

252-T. Flame Radiation and Furnace Efficiency. Max Davies. *Murex Limited Review,* v. 1, 1952, p. 233-238.

International joint experiments conducted on a specially constructed furnace at the Royal Netherlands Steel Co., Ijmuiden, Netherlands. Construction diagram. (T5)

253-T. Chrome Stainless: Easing the Pinch. Richard E. Paret. *Steel,* v. 130, Apr. 28, 1952, p. 79-80.

Certain high and low-Cr steels possess good mechanical properties, high fabricability and are excellent replacements in stainless applications formerly requiring Ni. (T general, Q general, SS)

254-T. The Preparation of Crucibles From Nitrides. L. S. Foster. *U. S. Atomic Energy Commission,* AECD-2942, July 1945, 60 pages.

Methods developed for manufacturing TiN and ZrN consist of first forming the corresponding hydride and then converting it to the

nitride by reaction with ammonia. Crucibles were made by standard ceramic techniques and fired in high-temperature induction furnaces. Hydrostatic pressing gave crucibles with very low porosities. Boron nitride showed promise as a crucible material and as an insulating material for the construction of high-temperature furnaces. Fe and Ce could be melted in nitride crucibles with appreciable contamination, but Be could not. Diagrams, tables, and graphs. 39 ref. (T29, T5, B19)

255-T. Honeycomb Structures Are Strong. James Blane. *Western Machinery and Steel World,* v. 43, Apr. 1952, p. 90-91, 120.

Production and applications of Al honeycomb sandwiches used in aircraft construction. (T24, Al)

256-T. Assembly-Line Construction of Light-Alloy Automobile Bodies. (In French and German.) J. Baron. *Aluminium Suisse,* v. 1, Nov. 1951, p. 206-219; v. 2, Jan. 1952, p. 26-33.

Use of Al alloys in the production of automobiles with respect to choice of alloy and forming technique. (T21, G general, Al)

257-T. Aluminum in the Canning Industry. A Short Review With Particular Regard to Developments in Norway. (In French and German.) D. Nickelsen and S. Buschmann. *Aluminum Suisse,* v. 2, Mar. 1952, p. 41-54.

History of use of aluminum cans for various types of foods in Norway. Surface treatment necessary if cans are to be stored over a longer period of time, particularly "eloxidizing". New Al alloys were tested for suitability as canning material. Acid content of foods was investigated in order to determine what foods are suitable for canning in this new type of material. Economic aspects considered. (T29, Al)

258-T. New Light Metal Construction for Shipping. (In French and German.) W. Fiedler. *Aluminum Suisse,* v. 2, Mar. 1952, p. 56-59.

New German applications, such as lifeboats, gangplanks, air tanks, and stacks. Advantages, particularly light weight and corrosion resistance. (T22, Al)

259-T. Light-Metal Crane Construction. (In French and German.) W. Stadelmann. *Aluminum Suisse,* v. 2, Mar. 1952, p. 60-63.

Construction details of various light metal cranes in the U. S., Germany, and Canada, with particular emphasis on savings in weight and costs. (T5, Al)

260-T. Aluminum Storage Tank for Fatty Acids. (In French and German.) K. J. Van de Loo. *Aluminum Suisse,* v. 2, Mar. 1952, p. 64-65.

Structural details of a tank manufactured and built in Holland. (T29, Al)

261-T. The Manufacture of a Wind Instrument. (In French and German.) Fr. Hirsbrunner. *Pro-Metal,* v. 5, Feb. 1952, p. 945-948.

Types of alloys used; methods for turning, brazing, hammering, and other operations. Materials are ferrous and nonferrous. (T9, G general)

262-T. Charts for Graphical Calculation of Long Aerial Cables With Aluminum-Base Conductors of 80 and 94.3 Sq. Mm. Cross Section. (In French.) Auguste Dalmasso. *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 46-49.

Two new charts make it possible to determine the mechanical characteristics of overhead conductors having level spans up to 4920 ft. as well as the corrections of tension and span used for precise definition of conditions of installation. Includes numerical example. (T1, Q general, Al)

263-T. Light-Alloy Automobiles. New Paris Autobuses. (In French.) Jean Keraval. *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 61-65.

Use of Al alloys in diesel-powered buses. 27% of the weight is saved. Other advantages. (T21, Al)

264-T. The English Trawlers "Red Rose" and "Red Hackle". (In French.) *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 66-67.

Use of Al alloys. (T22, Al)

265-T. Aluminum Sun Shield for the Camirant Substation. (In French.) *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 79.

Large sun shield composed of 105 mobile slats moved by three hydraulic jacks. Made of anodized Al, except the frame, which is of steel. (T26, Al)

266-T. Application of Light Metals in Self-Supporting Bodies of Buses, Trolley Buses, and Railroad Cars. (In German.) Arne Brinck. *Aluminium,* v. 27, Oct. 1951, p. 36-39.

Norwegian experiences. (To be continued.) (T21, T23, Al)

267-T. Reduction in Operating Costs Achieved by Using Light Metals for "Self-Supporting" Electric Cars. (In German.) M. Preuss. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 37-39.

Calculates savings in energy consumption and in wear, etc., achieved by use of Al alloys because of weight reduction. Tables and graphs. (T23, Al)

268-T. Light Metals in Modern Structures. (In German.) E. W. Pleines. *Aluminium,* v. 28, Mar. 1952, p. 69-74.

Technical and economic advantages. Review of noteworthy light-metal structures. New hangars at London airport. (T26, Al)

Engineering Laboratory Welding Engineer

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269-T. Aluminum as a Construction Material for the Chemical Industry. (In German.) E. Franke. *Aluminium*, v. 28, Mar. 1952, p. 75-76.

Brief review, giving compositions of recommended alloys for corrosion resistance to various materials. 13 ref. (T29, R general, Al)

270-T. Light-Weight Construction for Drilling and Conveying Equipment. (In German.) Erich Bahke. *Erdöl und Kohle*, v. 5, Mar. 1952, p. 151-159.

Practical designs. (T28, Al)

271-T. Stainless and Acid Resistant Steels in Chemical Engineering. (In German.) Hermann Braun. *Werkstoffe und Korrosion*, v. 3, Mar. 1952, p. 93-98.

Indicates that the most highly alloyed type is not always the best for a particular application. Various types of corrosion; typical data. (T29, R general, SS)

272-T. Concerning Some Applications of Light Alloys for Bearings in Railway Equipment. (In Italian.) L. Paglialunga. *Allumino*, v. 21, Jan. 1952, p. 43-47.

Experimental results in comparison with other bearing metals show better high-temperature wear and fatigue resistance. (T7, Q7, Q9, Al, SG-c)

273-T. Titanium in Aero-Engine Construction. H. H. Hanink. *Aeroplane*, v. 82, Apr. 25, 1952, p. 494-497.

Use, properties, cost and weight analysis. Compares with high-strength alloy steels. (T24, Q general, Ti)

274-T. Prevention of Metal Plate Oxidation in Lithographic Platemaking. Charles W. Latham. *American Printer*, v. 133, May 1952, p. 24-25, 50, 52, 54, 56.

Cronak or Brunak treatment for metal lithographic plates. Prevents oxidation, simplifies platemaking, improves printing, produces sharper images, and improves grain characteristics. (T9, Zn, Al)

275-T. Platinum Metals in the Chemical Laboratory. *Chemical Age*, v. 66, Apr. 26, 1952, p. 645-648. (T29, Pt)

276-T. The Metals Used for Mechanical Springs. F. P. Zimmerli. *Metal Progress*, v. 61, May 1952, p. 97-106.

The first portion of the 1951 William Park Woodside lecture. Various steels, Cu alloys, and Ni alloys; their mechanical and other properties, compositions, and selection for specific usage. Tables. (To be continued.) (T7, Q general, ST, Cu, Ni, SG-b)

277-T. Tool Steel Investment Castings Meet Physical Requirements of Strapping Tools. *Precision Metal Molding*, v. 10, May 1952, p. 26-27, 85-87.

Materials are cast in polystyrene patterns. (T6, E15, TS)

278-T. This Industrial Designer Chooses Die Castings For Sales Appeal and Manufacturing Economy. Albert M. Sanders. *Precision Metal Molding*, v. 10, May 1952, p. 28-29, 82-84.

Work at Allen-Stevens Corp., N. Y. for die casting of a housing for a new-type, self-contained portable spray unit. Material is zinc. (T10, E13, Zn)

279-T. Lead Die Casting Protects X-Ray Film. *Precision Metal Molding*, v. 10, May 1952, p. 32.

Pb die casting made by the National Lead Co., New York, for the storage of both exposed and unexposed dental X-ray films. (T10, E13, Pb)

280-T. From Pressed Steel to Die Casting — Result — Increased Rigidity and Lower Costs. *Precision Metal Molding*, v. 10, May 1952, p. 34, 79.

How Berns Mfg. Co., Chicago, changed many of their fan components from press-formed and welded steel units to Zn die castings. This change has resulted in a fan that operates quietly and vibrationless for a longer time and at a lower manufacturing cost. (T27, E13, Zn)

281-T. Investment Cast Cutters of Stainless Steel Have Cemented Carbide Tips. *Precision Metal Molding*, v. 10, May 1952, p. 37.

Small cutters which Chicago Pump Co. uses on its sewage comminutors. (T6, E15, SS, C-n)

282-T. Investment Castings in Aluminum Alloy for Midget-Size Centrifugal Pump. *Precision Metal Molding*, v. 10, May 1952, p. 43. (T4, E15, Al)

283-T. Sturdy Permanent Mold Castings That Resist Severe Impact. *Precision Metal Molding*, v. 10, May 1952, p. 44.

Use of Al permanent-mold castings in a special alloy containing 4% Cu and 6% Si for production of children's golf clubs and horseshoes. It casts well, has a smooth surface and adequate strength. (T10, E12, Al)

284-T. Opportunities Now for Designing With Aluminum-Coated Steel. W. B. Nixon. *Stove Builder*, v. 17, May 1952, p. 51-52, 54.

Adaptability for stove application. (T10, Al, ST)

285-T. Possibilities and Limitations in the Substitution of Light Metals for Steel and Copper. Jean Matter. "Proceedings of the United Nations Scientific Conference on the Conser-

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vation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 254-256; disc., p. 265-268.

Savings that can be effected by substitution of Al alloys for steel. Cu, and Sn. Examples are use of light alloys in the place of steel for freight cars, use of Al in electric cables, saving up to 1 ton of Cu per km. of line at 60,000 volts, substitution for tinplate in the manufacture of milk cans.
(T23, T1, T29, Al, ST, Cu, Sn)

286-T. The Casino *de la Girande Cote.* (In French.) *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 92-93.

Use of light alloy shell-type elements, supported by circular stone walls. (T26, Al)

287-T. Transit Room of the Observatory of Paris. (In French.) *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 94-95.

Double-walled Al-alloy panels are used. (T25, Al)

288-T. Magnesium in the Textile Industry. (In French.) Bernard Raclot. *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 97-100.

Mg applications demonstrated at recent International Textile Exposition, Lille, France. (T29, Mg)

289-T. Rubber-Tired Cars of the Swiss Federal Railways. Comparison Between the Light-Alloy Cars Built by the *Societe Industrielle Suisse* and the *Compagnie Industrielle de Materiel de Transport.* (In French.) Jacques Valeur. *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 101-109.
(T23, Al)

290-T. Stainless Alloys Used In Traumatological and Orthopedic Surgery. (In Portuguese.) Lybio Antunes Maciel. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 520-523; disc., p. 523-526.

Principally austenitic stainless alloys and the alloy "Vitallium".
(T10, SS, Co)

291-T. (Book) **The Science of Flames and Furnaces.** M. W. Thring. 416 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.50.

Deals with industrial furnaces from point of view that furnace of the future will be a precision tool of highest accuracy, controlled by instruments of highest sensitivity. Lays stress on gap between fundamental sciences and furnace design and use. Sections on thermodynamics and heat transfer. Chapter summaries, table of conversion factors, index, diagrams, and charts. (T5)

V

MATERIALS
General Coverage of Specific Materials

84-V. Copper and Copper Alloys. Clement Blazey. *Australasian Engineer,* Feb. 7, 1952, p. 69-75. (From Symposium on "Modern Trends in Non-Ferrous Metals and Alloys".)

Summarizes the present position of Cu and Cu alloys, from both research and practical aspects, in general terms. Changes and trends in production and uses of Cu; reasons for believing that plain Cu and Cu-Cd will retain their position as the principal electrical conductors. Composition, heat treatment, and properties of typical age or temper-hardening alloy. The manner in which established alloys are being modified in composition for both general and special uses. Study of creep and fatigue. 12 ref. (Cu)

85-V. The Aluminium Industry History, Production Processes, Future Prospecs. L. W. Malmgren. *Australasian Engineer,* Feb. 7, 1952, p. 82-91.
(Al)

86-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 208.

Data on highly corrosion resistant 20-29-2-3 Cr-Ni-Mo-Cu alloy for machinability, heat treatment, weldability, corrosion resistance, and mechanical and physical properties. Especially useful for handling hot corrosive chemicals.
(R5, R6, R7, SS)

87-V. Spheroidal-Graphite Iron up to Date. W. W. Braidwood. *Foundry Trade Journal,* v. 92, Mar. 27, 1952, p. 323-329; Apr. 3, 1952, p. 361-366, Apr. 10, 1952, p. 393-394.

Progress of spheroidal-graphite iron to date, and forecasts its future. Nomenclature, properties, specifications, microstructure, heat treatment, hardness, machinability, heat resistance, and casting. 31 ref. (CI)

88-V. Gallium. G. H. Wagner and W. H. Gitzen. *Journal of Chemical Education,* v. 29, Apr. 1952, p. 162-167.

General discussion. History, properties, occurrence, recovery, analysis, production and prices, and uses. 39 ref. (Ga)

89-V. Carbon and Graphite Materials and Parts. Philip O'Keefe. *Materials & Methods,* v. 35, Apr. 1952, p. 119-133.

Engineering properties, fabrication and design, mechanical parts, electrical, refractory, and chemical applications. (C)

90-V. Properties and Use of Nickel and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 18, Mar. 1952, p. 73-80; Apr. 1952, p. 123-128.

A general discussion. Includes illustrations, graphs, and tabular data. (T general, Ni)

91-V. Stainless Clad Copper for High Temperature Service. Joseph Kinney, Jr. *Product Engineering,* v. 23, Apr. 1952, p. 129-133.

Offers a combination of the high thermal conductivity of Cu with the corrosion and heat resistance of stainless steel. Data on mechanical and physical properties, workability, corrosion resistance, annealing, and welding are charted.
(Cu, SS, SG-g, h)

92-V. Cemented Carbide Families Grow. J. S. Gillespie and I. L. Wallace. *Steel,* v. 130, Apr. 21, 1952, p. 84.

New developments, properties, corrosion and heat resistance data, and applications. (C-n)

93-V. Titanium. *Welding Journal,* v. 31, Apr. 1952, p. 330-331.

A general discussion. (Ti)

94-V. High Strength Nonheat-Treated Aluminum Casting Alloys. Walter Bonsack. *American Foundrymen's Society,* Preprint 52-44, 1952, 7 pages.

Compositions and properties, comparing the modern Al-Mg-Zn types with the older heat treatable casting alloys. Tables and graphs give compositions, mechanical properties, and aging effects. Corrosion resistance, brazability, machinability, dimensional stability, and castability. (Al)

95-V. Fe-Ni-Co Alloys for Glass to Metal Seals. K. H. Mairs. *Journal of Metals,* v. 4, May 1952, p. 460-464.

History, composition, properties, microstructure, effects of heat treatment, and uses for Kovar and Fernico alloys. Tables, diagrams, and photomicrographs.
(K11, M27, J general, P11, Fe, SG-s)

96-V. History and Development of Aluminium Silicon Alloys. E. Scheuer. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B40-B49.

History of Al-Si alloys from their first preparation roughly 100 years ago, to their first industrial application in 1920. Theoretical aspects of the modification process; development of other Al-Si alloys combining the good casting properties of the eutectic alloy with better machinability and greater stiffness. Special applications of Al-Si alloys, including a group developed for pistons which exploits the low coefficient of expansion and high wear resistance produced by Si additions, and the few specific cases where Al-Si alloys are utilized in the wrought form. 36 ref.
(T general, Q general, Al)

97-V. Where Is Cast Iron Going To? P. A. Russell. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B110-B120; disc., p. B120-B123.

Economic and technological trends. Mechanical properties and microstructures.
(T general, Q general, M27, CI)

98-V. Production and Properties of Aluminium Casting Alloys. F. H. Smith. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A198-A217; disc., p. A217-A221.

Previously abstracted from *Institute of British Foundrymen;* item 115-V, 1951. (A8, Al)

99-V. Non-Ferrous Metals in Engineering. G. L. Bailey. *Times Review of the Progress of Science,* Aug. 1951, p. 2-3.

Brief review of recent developments emphasizing heat and corrosion resistant alloys and production of sound castings.
(T general, E25, EG-a, SG-g, h)

100-V. Titanium Carbide: a Very Refractory and Light Substance. (In French.) M. Oswald. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 75-87.

Heat resistance; solvent properties for other elements (including the systems Ti-C-N, Ti-C-O, Ti-C-N-O, TiC-N-Zr, Ti-C-N-Cb, Ti-C-N-V, and systems with nonisomorphous carbides); density of TiC and some of its solid solutions; production and applications; and general conclusions. Tables and graphs. 21 ref. (Ti, C-n)

101-V. Some Characteristics and Special Features in Development of Aluminum and Aluminum Alloys. (In German.) W. Bleicher. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 20-27.

Preparation of alloys, manufacture of semifinished products, and their processing. Diagrams, graphs, micrographs, and photographs. (Al)

102-V. Chromium; Ranks Among the Most Strategic of Metals. Roland D. Parks. *Mining Engineering,* v. 4, May 1952, p. 469-475.

Metallurgical uses, grades of ore and deposits, world reserves, and demand. Table gives world production of chromite. (A4, B10, Cr)

103-V. How to Substitute a Boron Steel. *SAE Journal,* v. 60, May 1952, p. 74-77. (Excerpts from "Boron and Other Low Alloy Steels", by Harry B. Knowlton.)

See abstracts of "An Investigation of Boron and Other Low-Alloy Steels", *Steel Processing;* items 59-V and 104-V, 1952. (AY)

104-V. An Investigation of Boron and Other Low-Alloy Steels. Parts II and III. H. B. Knowlton. *Steel Processing,* v. 38, Mar. 1952, p. 131-133; Apr. 1952, p. 186-190.

See abstract of Part I; item 59-V, 1952. (AY)

(Continued on p. 62)

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M.I.T. Holds Conference On Metal Cutting

The new metals processing laboratory at the Massachusetts Institute of Technology was dedicated on June 3. The dedication program was followed on June 4 and 5 by a 2-day technical conference on metal cutting, and featured speakers of national reputation in the metal cutting field.

Speakers included C. Richard Soderberg, head of the department of mechanical engineering, who spoke on "Metal Processing and Mechanical Engineering"; and John Chipman, head of the department of metallurgy, and A.S.M. president, who spoke on "Metal Processing and Metallurgical Engineering".

A survey of the teaching and research activities in metal processing at M.I.T. was presented in two concurrent sessions: "Mechanical Metallurgy", chairman Carl F. Floe, assistant provost and professor of metallurgy, and "Machine Tool Engineering and Metal Cutting", chairman Milton C. Shaw, associate professor of mechanical engineering.

The session on "Mechanical Metallurgy" included papers on "The Undergraduate Teaching Program", by John Wulff, professor of metallurgy; and "Graduate Teaching and Research", by Howard F. Taylor, associate professor of metallurgy.

These talks were followed by laboratory visits and discussions in the new building. The series included "Metal Working", by W. A. Backofen; "Welding", by Harry Udin; "Foundry", by H. F. Taylor and "Powder Metallurgy", by Amos J. Shaler, all associate professors of metallurgy at M.I.T.

The session on "Machine Tool Engineering and Metal Cutting" featured three lectures: "The Teaching Program", by P. A. Smith, associate professor; "Thermal Considerations in Machining", by E. G. Loewen, research assistant; and "Cutting of Crystalline and Noncrystalline Materials", by N. H. Cook, instructor, all from the department of mechanical engineering.

The conference on metal cutting, held on June 4 and 5, and sponsored by the machine tool division of M.I.T.'s department of mechanical engineering, was planned to bring together a group of persons engaged in machine tool engineering for the purpose of sharing experiences and discussing new ideas.

The conference was divided into four sessions. Major themes of these sessions were "Thermal Aspects of High-Speed Machining", "Wear and Tool Life", "Applications of Metal Cutting Research to Machining Operations", and "Mechanics of the Cutting Process". Three technical papers were read at each session.

(*Continued from p. 60*)

105-V. The Future of the Light Metals. H. Sutton. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 246-252; disc., p. 265-268.

Early history and essential features of modern methods of production. Possible alternative methods. Recovery of aluminum from scrap and used parts. Applications. Recent advances in the Mg-alloy field. Position of the less common light metals, Be and Ti. 36 ref. (Al, Mg, Be, Ti)

106-V. The Future of Light Metals With Special Reference to Titanium. Oliver C. Ralston. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 252-254; disc., p. 265-268.

Brief review. (Ti)

107-V. (Book) Electrolytic Manganese and Its Alloys. Reginald S. Dean. 257 pages. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. $12.00.

Growth of electrolytic Mn production since 1936. Restricted to production of electrolytic Mn, to properties and uses of alloys in which it is necessary, and to alloys in which electrolytic Mn produces properties significantly different from the use of other Mn types. Much material in the book was obtained from reports issued by the Bureau of Mines. (C23, Mn)

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Edited by John T. Burwell, Jr., *Associate Professor*
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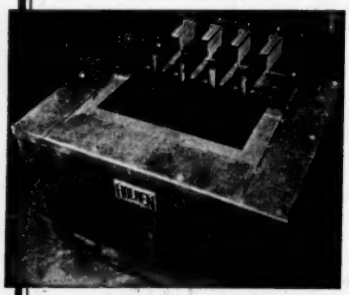

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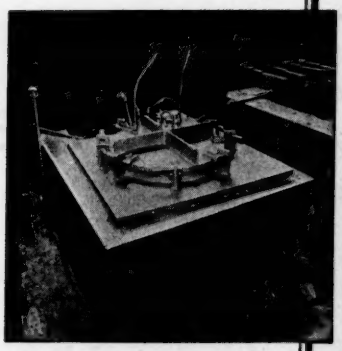

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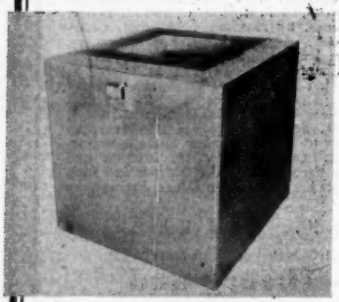
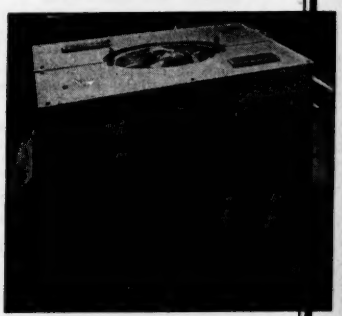


Prefabricated ceramic pot assembly, for use in over-the-side electrode furnaces with neutral baths.



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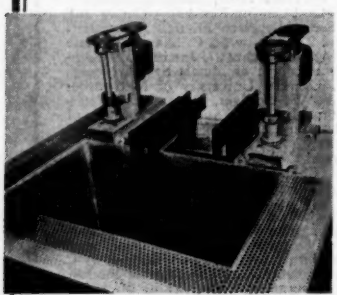
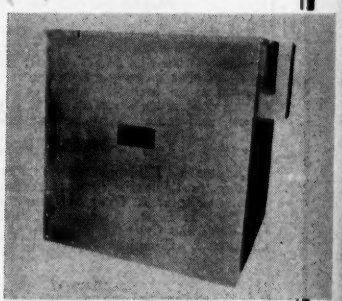
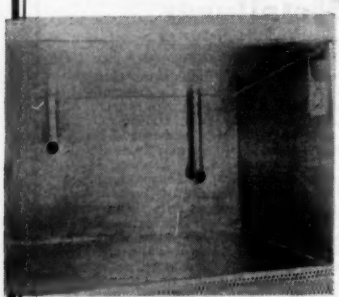


Type 401 Marquenching Austempering Furnace.

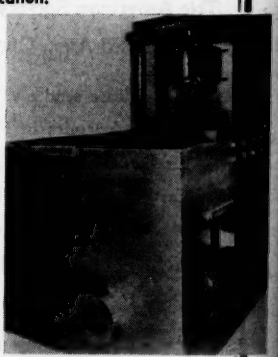


Furnace assembly of martempering-austempering unit, gas fired for small production application.

View of the quenching area in Type 401 Furnace.



View of inlet and exciting air for cooling marquenching-austempering furnace where large volume of work is being processed.



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